This study looks into heavy metal harmony from the point of view of music theory and analysis; the main focal point is the era that has been called "classic" or "traditional". This era ranges roughly from the late 1960s to the mid-1980s, including bands such as Black Sabbath, Deep Purple, Led Zeppelin, Judas Priest, and Iron Maiden. The study illuminates characteristics – from the elementary to the complex – which may be considered central to the harmonic language of heavy metal in that time period. Meanwhile, the applicability of traditional theories and methods of music analysis are discussed in the context of this music.

Heinrich Glarean (1488–1563), who is depicted on the front cover, can be thought of as having originated the modal framework on which most of classic heavy metal is based.

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Esa Lilja

Classic Heavy Metal Harmony

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Theory and Analysis of Classic Heavy Metal Harmony

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Helsinki, September 2009

Esa Lilja

Contents

1

Introduction

> The old theory books say that parallel 5ths are forbidden. We know that this is ridiculous, and it must be thrown out or modified to fit our present day thinking. (Russell Garcia 1954: i.)

This thesis explores melodic and harmonic features of heavy metal, and while doing so, explores various methods of music analysis; their applicability and limitations regarding the study of heavy metal music. The subject of the study is a musical style called heavy metal, and more precisely, the traditional forms of the so-called classic era. The analytical corpus stretches from the so-called pre-heavy metal of the late 1960s concentrating mainly on psychedelic and blues rock groups that are heavy metal's primary and most recent precedents, to the most important groups of the mid 1980s. The reason for ruling out later heavy metal is that the genre was reasonably unified in musical terms until the mid 1980s, after which it ultimately fractured into ever growing number of subgenres. Furthermore, the underlying musical grammar that serves as a reference point for later forms of metal was also codified in the classic era. Given the diminutive number of academic works on heavy metal's musical characteristics, the corpus discussed here should be vast enough.

1.1. General Introduction

The study is built on three general hypotheses according to which 1) acoustic characteristics play a significant role for chord constructing in heavy metal, 2) heavy metal has strong ties and similarities with other Western musical styles, and 3) theories and analytical methods of Western art music may be applied to heavy metal. It seems evident that in heavy metal some chord structures appear far more frequently than others. It is suggested here that the fundamental reason for this is the use of guitar distortion effect. Subsequently, theories as to how and under what principles heavy metal is constructed need to be put under discussion. Furthermore, it seems that analytical models regarding, for

example, the classification of consonance and dissonance and chord categorization should be revised to meet the common practices of the music in question.

It is evident that heavy metal is not an isolated style of music. On the contrary, it has striking similarities with various styles of Western music, and not only with the "boogie blues" as suggested by Will Straw (1990: 97). Some influences have been explored before. For instance, the effects of Classical and Baroque music on heavy metal are discussed by Robert Walser (1993: 57–107). This study strides towards a broader set of examples by exploring stylistic features of medieval and Renaissance music that may be considered as relevant sources for heavy metal. Moreover, it is suggested that the theoretical background to the construction of Western music and its analysis can offer invaluable insights to heavy metal. However, the analytical methods need to be reformed to some extent to meet the characteristics of the music.

While heavy metal has been under little academic scrutiny, even less work has been done from the point of view of music theory and analysis. The few book-length studies on heavy metal are primarily concentrated on extra-musical aspects. Deena Weinstein (2000) has focused on the social dimension of heavy metal describing it as "a transaction between the artists, audiences, and mediators that enable the genre to exist" (ibid: 4, 8). Another sociologist, Keith Kahn-Harris (2007) explores some of the latest and extreme forms of heavy metal. Susan Fast's (2001) study on Led Zeppelin and Glenn T. Pillsbury's (2006) study on Metallica combine musicological and cultural-sociological approaches. Harris M. Berger (1999) has studied the musical experiences of death metal musicians using ethnographic case studies, and attempted to find relationships between musical activity and large-scale political and economical conditions, and "to provide new insights into the interpretation of musical experience and the role of expressive culture in society" (ibid: 2–3). Robert Walser (1993: xiv) draws "attention to the *music* of heavy metal, in ways that are both textually specific and culturally grounded". Although the main concerns in these studies are socio-cultural, the aforementioned authors nevertheless make important points about musical aspects of heavy metal, and thus are much referred to throughout this study. Regarding the music analytic scope of this study, however, the most important are Walser's insights – especially those concerning heavy metal's appropriation of classical music (see Walser 1993: 57–107; earlier publication in Walser 1992). In addition, there are a number of popular books as well as various kinds of writings in numerous semi-professional magazines and fanzines. Although having a varying degree of musical competence, they can often offer invaluable contemporary anecdotes and insights to history and formation of the genre. In lieu of academic research, this material is cited when considered appropriate or necessary to illuminate a certain point.

Each chapter is structured in such a way that the underlying theories are presented first, followed by discussion of their applicability to heavy metal. Beginning with a survey of problems regarding genre labelling, Chapter 2 presents a history of heavy metal that concentrates on historical and cultural points essential for the development of the genre. The general history is dealt with in brief, since much substantial work has been done elsewhere. Existing writings on history include a few academic studies, the most important being Weinstein's (2000), Walser's (1993), and Kahn-Harris's (2007). In addition, there are recent historiographies by distinguished heavy metal journalists such as Ian Christe (*Sound of the Beast* 2004) and Martin Popoff (2003, 2004), as well as a plethora of autobiographies and memoirs. Just to mention some of the most recent writings dealing with heavy metal history, there are those authorised by musicians such as Motörhead's Lemmy Kilmister (2003), and others by people closely involved with the field such as Sharon Osbourne (2005) and Black Sabbath's 1970s road crew members David Tangye and Graham Wright (2005). In addition, the volume of audiovisual material has massively grown in recent years. One of the most recent and substantial (although, in some ways perhaps a little biased) is a documentary *Metal – A Headbanger's Journey* (2005) directed by anthropologist Sam Dunn, which includes interviews with the three aforementioned scholars (Weinstein, Walser, Kahn-Harris) alongside historically interesting perspectives offered by distinguished heavy metal musicians such as Lemmy, Alice Cooper, Dee Snider (from Twisted Sister), Tony Iommi (Black Sabbath), Ronnie James Dio (Rainbow, Black Sabbath, Dio), and Bruce Dickinson (Iron Maiden).

As already established, the core of this study is music theory and music analysis. From Chapter 3 onwards the thesis addresses questions on heavy metal chords, melody and harmony. These are looked into from the perspective of acoustic, scalar, modal and tonal formation, and attention is given to both vertical and linear aspects. Chapter 3 discusses fundamental concepts that underpin all Western music theory, analysis and composition, such as interval, chord, harmony (Chapter 3.1), scale-degree systems (Chapter 3.2) and consonance/dissonance division (Chapter 3.3). Furthermore, two major strains of Western harmonic theory are given attention. These are 1) the figured-bass derived scale-degree theories (e.g. Gottfried Weber and Heinrich Schenker), and 2) the fundamental bass derived function theories (e.g. Jean-Philippe Rameau and Hugo Riemann) (cf. Hyer 2002: 733; Klumpenhouwer 2002: 456). Both of these theoretical strains are discussed in relation to heavy metal in Chapter 3.4, whereas Chapter 3.5 concentrates on less than unambiguous concepts of "counterpoint" and "voice leading". Broadly speaking, voice leading in heavy metal seems to be a mixture of several musical traditions. For example, it appears that features of the pre-common practice era co-exist with the common-practice ones.

Although scale-degree theories dominate analytical language in Europe and North America, function theories have been continuously applied in continental Europe (e.g. Lendvai 1971, Burbat 1988), and Nordic countries (e.g. Krohn 1923, Ingelf 1990, Henriksson 1998, Lilja 2001 and 2002). Furthermore, there is a seemingly growing interest in the United States in revisions of Riemannian function theories (e.g. Harrison 1994, Cohn 1997). Scale-degree theories ultimately rely on the major or minor scale as their referential point of departure; chords are formed by the constituent members of a scale (see Hyer 2002: 734–735; also see Chapter 3.2). On the other hand, function theories treat harmonic relationships as a fundamental characteristic of tonal music; the main concern being on as to how chords and harmony relate to a tonal centre. A great number of concepts of harmonic function in this study are based on Daniel Harrison's (1994) work. This is done much because of his non-prejudicial attitude towards any musical style accompanied with his flexible nomenclature.

A major analytic tool adopted here is founded on a modal system suggested by Allan F. Moore (1992; 1995; 2001: 53–55), in which the scale steps are seen in the context of a mode (see Chapter 3.2). Table 1.1 shows the modes (or, scales) that are frequently used in heavy metal, with scale degrees numbered in relation to a major scale (cf. Lilja 2002: 41). For example, the Dorian 3rd degree is a minor and the 6th a major. This kind of presentation is rather common in tutorials and textbooks for practising musicians (e.g. Whitehill 1989, Miller 1992).

Mode	**Abbreviation**	**Scale-degrees**						
Ionian (i.e. major scale)	ion	1	2	3	4	5	6	7
Dorian	dor	1	2	♭3	4	5	6	♭7
Phrygian	phr	1	♭2	♭3	4	5	♭6	♭7
Lydian	lyd	1	2	3	♯4	5	6	7
Mixolydian	mix	1	2	3	4	5	6	♭7
Aeolian (i.e. natural minor)	aeo	1	2	♭3	4	5	♭6	♭7
Locrian	loc	1	♭2	♭3	4	♭5	♭6	♭7
Harmonic minor	hm	1	2	♭3	4	5	♭6	7
Melodic minor	mm	1	2	♭3	4	5	6	7
Hungarian minor	hum	1	2	♭3	♯4	5	♭6	7

Table 1.1. Typical heavy metal modes.

Analytical symbols in use are based on generally accepted nomenclature on the field, including scale degree notation, Schenkerian notation and Riemannian function symbols. However, some of them are modified when needed. As Walser (1993: 46) has stated, the most common modes in heavy metal are Aeolian and Dorian. Thus, in most cases the non-diatonic chords are seen as borrowed from other modes than these. For this reason, symbols addressing modal borrowing are added to the scale degree nomenclature. Furthermore, some symbols are added due to the acoustic characteristic of distorted chords (as discussed in Chapter 4). Also the common nomenclature that designates harmonic function is slightly modified with an intention of increasing its descriptive qualities regarding this music.

The key symbols are presented in the following list, which is not intended to be exhaustive. The list offers a range of examples from which the reader should be able infer the operating principles. Detailed explanations for these symbols appear in Chapters 3 through 5, where they are used in their appropriate musical contexts. The symbols are used in the analyses when considered appropriate for clarifying a certain analytical point. Thus, to avoid overwhelming complexity, not all examples are marked with all possible symbols.

Symbol	*Indication*
E-aeo:	symbols refer to chords in the E-Aeolian mode
I^5	power chord (on scale degree one)
I/3 or I_3	first inversion of a triad, the third is in the bass
$I^{(5)6}$	two-note chord in which the sixth substitutes for the fifth
I^q	quartal chord
dorIV	Dorian chord on scale degree four
~	vertical (non-diatonic) consonance (see Chapters 4.5 and 4.6)
ĨĨ	vertically consonant triad on scale degree two
^	melodic tone in relation to the tonic
$\hat{3}$	third scale degree of a mode (in melody)
B$\hat{3}$	blue third (in melody)
VofV or V/V	secondary dominant
T, t	Tonic function (capitalized when "strong", small when "weak"; see Chapter 3.4)
S, s	Subdominant function
D, d	Dominant function
S&D	harmony expressing simultaneously both Subdominant and Dominant functions
(S), **(D)**	functional relation to following harmony is expressed with parentheses
←(D)	functional relation to preceding harmony

Musical acoustics plays a significant role in heavy metal harmony. Chapter 4 concentrates on typical chord structures used in heavy metal and the acoustic phenomena resulting from guitar distortion. Special attention is given to the so-called "power chord". The characteristics of distorted guitar sound impact significantly upon chord construction and, furthermore, on the way distorted chords can be understood in a broader musical context. The discussion here takes as its starting point the concepts of, for example, Jean-Philippe Rameau and Hermann von Helmholtz. Their applicability to a modern context is critically discussed and brought together with more recent studies in acoustics.

The present study is one of the first efforts to discuss these matters systematically. I have addressed the effect of guitar distortion on chord construction in my earlier writings (Lilja 2004; 2005: 10–22), although in a more theoretical manner. Here, the previously argued points are elaborated and polished, and supported with hard data provided by musical acoustics. Other recent studies have addressed the use of distortion effect in heavy metal. For instance, Harris M. Berger and Cornelia Fales (2005) have studied the concept of "heaviness" in metal music. Although supported with spectrograms of guitar sound from different time periods, their study appears to be more preliminary than conclusive work on the matter. The present study has some points of disagreement, especially on the acoustic reality of combination tones.

Chapter 4 also addresses distortion effect from a musical point of view. A new consonance/dissonance division is suggested based on the acoustic characteristics of distorted intervals and chords. It is also suggested that distortion is an important reason why some chord structures are more frequently used than others. For instance, it appears that distorted triads have more dissonant qualities than power chords. This can explain why the power chord is the most frequent chord structure in heavily distorted music. Moreover, from the point of view of traditional theories of harmony, some chord structures are frequently applied to seemingly odd scale degrees. For these reasons, a new chord classification model is introduced based on modal and acoustic characteristic of distorted chords. It is suggested that looking at heavy metal chord construction from a different point of view will increase understanding of the rationale behind its compositional structure, which in certain ways differs from the traditional explanations.

Chapter 5 addresses different cases of borrowings from other styles of music to heavy metal. As with any other musical style, heavy metal has not developed in isolation. From the very beginning, heavy metal has featured qualities identified with other traditions. Through various borrowings (e.g. Burkholder 2009), which are shown on different levels of musical construction, heavy metal is here seen as a part of the continuum of Western music. Musical relationships of heavy metal and other styles of Western popular and art music are actually

rather easy to detect. The kind of cultural fusion heavy metal appears to be, can be further explained with processes of *enculturation* (e.g. Sloboda 1985: 196) and *acculturation* (e.g. Herskovits 1938). Returning to the focal point of this study, Chapter 5 concentrates on melodic and harmonic practices and schemes that heavy metal has in common with other musical styles. For instance, the significance of the blues as well as European art music is discussed. Furthermore, some idiomatic melodic and harmonic progressions are pointed out. As discussed in this chapter, all of the characteristics presented have appeared in different forms throughout the history of Western music. Accordingly heavy metal is seen here not as an isolated genre but as a fusion of various styles.

Chapter 6 not only draws together the theories and analytical concepts discussed in earlier parts of the study, but concentrates on linear and structural aspects of harmony. Theories and methods that are applied for this derive ultimately from ideas originated by Hugo Riemann (1849–1919) and Heinrich Schenker (1868–1935), both of whom have gained a vast number of adherents. Their adaptation here is not a case of a wholesale acceptance. On the contrary, they are more or less freely applied, the main point being their applicability to heavy metal. Furthermore, linear analysis and harmonic function are not seen as contradictory, but complementary. Although some have suggested that the two models could be unified (e.g. Padilla 1997a: 160n30), such an accommodation has been found rather rarely in music theory and musicology. The chapter concludes with a lengthy analysis of a classic heavy metal composition, Black Sabbath's "Heaven and Hell".

1.2. Why Music Analysis?

As a field of academic study popular music is relatively young, only three or four decades. Not many people have been privileged to study popular music as a major subject as opposed to the so-called art music; the opportunity to do so has presented itself only fairly recently, when compared to the educational tradition of Western art music. The first departments specialising in popular music (and mostly jazz) were founded in the United States only after the Second World War (see e.g. Kennedy 2006). It is perhaps due to its relative novelty that popular music studies are overburdened with florid value judgements. Amongst popular music scholars in general it is quite common to give little attention to music and concentrate on the vast amount of extra-musical factors instead. For example, there has been a common consensus between social scientists and musicologists that systematic structural analysis of popular music is not worthwhile. Probably due to a republication of the 1941 article "On Popular Music" in an influential article collection (Frith & Goodwin 1990), this line of thinking stems from Theodor W. Adorno, who could be described as an arche-

typal enemy of popular music. Quite understandably, however, it is a less than a fruitful starting point for analysis, if a musical style is dismissed altogether as "uninteresting" or "diminutive" before a closer look has been taken. Simplicity is relative and much depending on the time on which a piece of music has been written. For example, Wolfgang Amadeus Mozart's early symphonies (that much resemble the style of Joseph Haydn) and Johann Sebastian Bach's chorales are nowadays considered as canonical works of Western art music. However, at the time of their composition they were probably not considered as anything special, let alone masterpieces. Furthermore, if complexity should be a criterion of musical value, these works would fare badly when compared to, for example, many compositions of Frank Zappa, who has typically not been considered as "serious" composer.

The analytical approach in popular music has been criticized for technical elitism that places it beyond the reach of other scholars in popular music studies. Furthermore, music analysis has been said to reveal nothing relevant about the music. This line of thinking is crystallized by a sociologist Simon Frith (1996: 64), when he wonders whether all these technical details tell us anything about the listener's experience. There is an ongoing distinction between different approaches to popular music: Philip Tagg (1982: 40) has said that "[m]usicology still lags behind other disciplines in the field, especially sociology". It seems, even, that the sociological approach is so prevalent that scholars having their focus in music analysis suffer from a bad conscience in not discussing it; various articles in a recent collection entitled *Analyzing Popular Music* (Moore 2003) show this. On the other hand, dismissing musical points while discussing various "meanings" has not required justification in so many words (see Kärjä 2005: 54–61).

Recent publications by distinguished scholars give the utmost attention to music analysis without defending the chosen standing point (e.g. Moore 2001; Covach 1997; Covach & Boone 1997; Everett 1999, 2000, 2001; Forte 1995; Walser 1993). It is true that music analysis is often linked with modernistic ideals such as originality and supposed autonomy of musical works coupled with strong authorship. However, these concepts have been questioned within the field over and over again. It is fair to say that nowadays there is a common consensus that music is a product of human societies, produced by and for social activities, and that all the interpretations made from it are always dependent on the context. In this process of finding "meanings" in music the musician's point of view many times seems to be overlooked. For a musician the utmost meaning of, say, C7 chord is "C7" including various possibilities to use a C7 within a given musical syntax. This kind of meaning in music is apparent in musicians' statements; for example, Judas Priest's guitar player Glenn Tipton has said that a song has to be "meaningful in its musical structure" (Stix: 1982:

34). Ultimately, the role of music analysis is, then, to answer the question as to why certain music did sound like it did, or why certain musical experience did feel like it did (cf. Moore 2003: 6; Tagg 1982: 41). Music analysis makes it possible to thoroughly know a musical tradition, as well as to strengthen and to transform it (Padilla 1997b: 6).

To discuss things further, there is a question as to how one can justify the use of methods originally designed for the analysis of Western art music. In part it is answered by the following. The notion of popular music as autonomous of the so-called art music is, in fact, a myth. As discussed by, for example, Peter Van der Merwe (1989) many features of Western art music were transmitted to early forms of popular music such as blues, country and the Tin Pan Alley style. European immigrants to the US brought along with them their instruments and systems of temperament. While most country blues (and later rock 'n' roll) artists were not formally trained in music, the majority of instruments used (e.g. guitar, piano, saxophone) were based on the Western scale systems. In addition, Western music theory has been a part of popular music for a long time. It is evident that musicians (formally trained or not) have been aware of the classical repertoire and, more importantly, its practices of musical organization. Examples in the early 20th century range from ragtime (e.g. Scott Joplin, Jelly Roll Morton) and early jazz (e.g. Paul Whiteman, Duke Ellington), through musicals (e.g. George Gershwin) to the Tin Pan Alley style that is much based on so-called parlour music (cf. Van der Merwe 1989: 221–286). To give a more contemporary example, material using the concepts and terminology of Western music theory has been published since the 1970s in magazines such as *Guitar Player*. This material was consumed by many heavy metal guitarists. In this light there should be no fundamental problem in applying the theories and methods of Western music analysis to popular music.

In conclusion, while the aim of this study is not to undermine the importance of any kinds of approach to music, it seems that much basic work with musical structures has yet to be done. This study conforms to an idea that music analysis is in the nucleus of musicology, as well as theories of music and musical composition (Padilla 1997a: 154–157; 1997b: 158; cf. Heiniö 1993: 25–26). It is useful to know how the music works in itself, before exploring "musical experience", "musical meanings", or other aspects incorporated in musical activities. For instance, it has been said that "apart from being a feeling, bluesiness is a set of musical features, which can be analyzed like any others. They obey laws which are very different from anything in orthodox classical theory, but these laws can be explained, and turn on the same few ultimate principles that govern all music." (Van der Merwe 1989: 117.) Furthermore, "[a]lthough the sounds of rock cannot, ultimately, be divorced from their [social and cultural] setting, they must be loosely separated in the interim, if the listening

act is to receive adequate attention in any discussion of the cultural practices of rock" (Moore 2001: 6). The study in hand is explicitly concerned with music analysis; this may prove to be helpful for future heavy metal studies that may have other perspectives.

1.3. On Transcription and Reductive Notation

In the analysis of popular music, there remains a question of the primary text (*Urtext*), which in most Western art music is a written score, whereas in popular music it is the live performance or recording. This brings forth the problems regarding transcription. Even though popular music is increasingly published as written scores, these have to be looked into with care. Usually these are arranged for commercial purposes and do not necessarily conform to original recordings; commercial publications may be simplified for amateur use, written for ensembles different from the original, and include obvious errors if compared to original recordings (cf. e.g. *The New Beatles Complete* 1992, *Iron Maiden Guitar Tab Edition* 1994, *The Best of Black Sabbath* 1996). It is therefore essential to consult the original recordings with analytic judgement.

Transcription includes analytical and interpretive processes (e.g. Padilla 1997a: 159), and thus, it is ultimately subjective. This relates to the "etic-emic" problem that is a much debated issue in popular music studies. In the field of ethnomusicology the distinction between "etic" and "emic" transcriptions plays a significant role. The immediate perception of music is said to be "etic" and "heard without insight into that culture's musical universe" (Chenoweth 1986: 50–51), whereas the ideal would be "the insider's view" that is said to be "emic". However, in Western music culture, largely due to education and to the general fact that Western people are exposed to the codes of Western music over and over again, there are some fundamental similarities in the way of hearing things. In this light it is fair to say that most analyses of Western music are "emic" (cf. Padilla 1997b: 5).

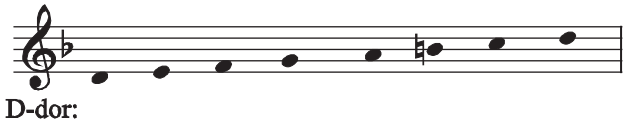
Reductions are particularly useful in analysing popular music as they show only a small part of the music. Their purpose is not to offer a score to be played, but instead, their usefulness lay in drawing attention to specific musical points while reducing other features to a minimum. The level of exactness, then, relates to what one needs to say (cf. Lerdahl & Jackendoff 1987: 124–145). If a dozen people transcribed the same performance, it could be said with certainty that the result is the similar number of differing texts. Because of the differences in analytical perspectives due to educational and personal background, each individual chooses to transcribe those features of the music they think are the most relevant. In most cases it is difficult or impossible, even, to say that any of these notations are fundamentally wrong. (Cf. e.g. Seeger 1977:

168–181; Chenoweth 1986: 50–58; England et al. 1964: 223–277.) The issue that a chosen method and an individual scholar affect the resulting transcription and analysis is closely related to the phenomena known as Heisenberg's "uncertainty principle" and "observer effect". Anyhow, as Philip Tagg (1982: 41) has argued, "notation should not be the analyst's main source material". To be able to speak about musical material, however, it has to be transformed to written form. In this process of transcription it is important to keep in mind that aural analysis should be the basis for final judgements.

All the transcriptions and reductions in this study are made by the author. Reductions do not conform to any strict method, but are rather constructed to illuminate a certain analytical point (cf. e.g. Meyer 1956). Hopefully this, too, might provoke some discussion in the future. Although the reductions and analyses made here strive towards an ideal genre-competent listener (cf. Moore 2003: 6), it is fair to say that the "ear" that makes the final analytic judgement is that of the author. It would be misleading to presume that every human being, encultured or not, hears all musical structures in the same way. With no doubt, someone else's ear would lead to more or less different conclusions.

A further note regarding transcription and reduction involves the ongoing debate about copyright issues (see e.g. Tagg 2001) that needs a brief comment. In accordance with Walter Everett (2001: xiii), I have endeavoured to ensure that musical examples presented "conform to all criteria of 'fair use' law by their insubstantial length, their scholarly purpose, their never before having been printed, and their unperformable nature".

Before entering further discussion, a basic nomenclature in use must be introduced. The designation of pitch follows Lloyd & Rastall (2004): *Italic* letters denote specific pitches in various octaves and non-italic capital letters denote general pitch classes. In differentiating various octaves, the Helmholtz system is applied throughout the study: the octaves above the middle C are designated as *c'* (= middle C) – *c"* – *c"'* – etc., and the octaves below are designated as *c* (one below middle C) – *C* – *C'* – *C"* – etc. (for the original nomenclature, see Helmholtz 1954: 15–16). The notational symbols indicating the tonic are implied with the sharp and flat signs as in traditional music theory. For instance, the D-Dorian mode is written with one flat sign as if it was in the key of D minor (Example 1.1). Additional markings, for which the abbreviations in Table 1.1 are used (in this case "D-dor:"), indicate the mode through which a score is interpreted.



Example 1.1. Notation of the D-Dorian scale

The nomenclature for harmonic function is largely based on Riemann: **T** = Tonic, **S** = Subdominant, **D** = Dominant. Furthermore, following Harrison's (1994: xiii) typography, a distinction is made between names of functions and names of triads; "The former are treated as proper nouns and are capitalized, the latter as common nouns and appear lowercase. Thus, a tonic triad can express Tonic function."

As a final remark, following common practice in popular music studies, individual compositions are put in quotation marks whereas albums are indicated with *italics*. In this way it is easy to differentiate, for example, the composition "Black Sabbath" from the album *Black Sabbath* (1970) and the band Black Sabbath.

2

Genre and History

This chapter takes a look into heavy metal as a musical genre as well as into its history, its formative cultural environment, and its main points of development. Here, the general history of heavy metal is only dealt with in brief, because much substantial work on the field has been done elsewhere (see Chapter 1).

2.1. On the Genre

In its early phase heavy metal was not identified as a genre, but rather the terms "heavy" and "metal" seem to be attempts to describe the new emerging style in the late 1960s (cf. Weinstein 2000: 18; Christe 2004: 10). The term first appeared in the rock press as an adjective, and only in the early 1970s as a noun, by which time, as Walser (1993: 7) has pointed out, it had become a distinctive musical genre. The origin of the term "heavy metal" is generally traced to the following sources. The beat writer William Burroughs included a character called "The Heavy Metal Kid" in his 1964 novel *Nova Express* (Walser 1993: 8; Weinstein 2000: 19), after which music journalists took up "heavy metal" as a descriptive term (Walser 1993: 8). An American critic and a Burroughs fan Lester Bangs has been credited with popularizing the term, for example, in a Black Sabbath article for *Creem* magazine in the early 1970s.[1] Another source that is often cited is Steppenwolf's motorcycle anthem "Born to be wild" (1967) which includes the phrase "heavy metal thunder" (Weinstein 2000: 19–20; Moore 2004; Walser 1993:8; Christe 2004: 10). However, as so often, it is likely that there is no one single source but rather several coexistent sources for the term. The term has also been used to refer to heavy artillery in the 19th century warfare terminology and heavy metal compounds in chemistry (see e.g. Walser 1993: 7; cf. Christe 2004: 10), and was, for one reason or another, considered a more suitable label for this new genre than, for example, "downer rock", a term with drug references (see Weinstein 2000: 305n17).

1. There are doubts about this (see Weinstein 2000: 19).

Defining a genre is not a simple task: "Genres are based on the principle of repetition. They codify past repetitions, and invite future repetitions" (Samson 2006). There have been various attempts to define heavy metal as a genre, the most recent of which are discussed here.

> Heavy metal is a musical genre. Although some of its critics hear it only as noise, it has a code, or set of rules, that allows one to objectively determine whether a song, an album, a band, or a performance should be classified as belonging to the category "heavy metal." That code is not systematic, but it is sufficiently coherent to demarcate a core of music that is undeniably heavy metal. (Weinstein 2000: 6.)

According to this line of thought, the musical genre "heavy metal" has distinguishable features that differentiate it from other genres of rock. However, as will be discussed below, many of these features are not musical. In fact, it seems that most genre labelling is done according to extra-musical rather than purely musical factors. According to Harris M. Berger (1999: 312) heavy metal is "a group of musical genres [… that …] often employs distorted guitar timbres, individual displays of virtuosity, and complex song forms". Like those of any musical genre, the boundaries of heavy metal are vague. Robert Walser (1993:4) says that "heavy metal" is "a term that is constantly debated and contested, primarily among fans but also in dialogue with musicians, commercial marketing strategists, and outside critics and censors". In answering the question of whether particular bands are, or are not, heavy metal, Brian Russ, a metal fan and webmaster of a heavy metal Internet encyclopaedia *BNR Metal Pages*, states the following:

> This is commonly asked about bands such as Korn, Nirvana, Papa Roach, and others, that may not fit the classic metal mold. This is a source of endless debate […] while there are some bands that everyone can agree are metal, there are others that are less clear. Is nu-metal metal? What about glam/hair bands […] are they metal? It's not an easy question to answer. I have tried to include bands that, if not obviously metal, have sufficient metallic qualities or are of interest to metal fans. (Russ 2004.)

It certainly seems that what is heavy metal for some is not heavy metal for others. The main reason for this appears to be a combination and interplay of the following factors that may be used to determine a listener/critic/musician: 1) generation/age, 2) cultural background/general listening habits, and 3) geopolitical location/country or continent of inhabitancy. The generation born around the early 1970s would perhaps consider Deep Purple as a heavy metal and, but in the case of Led Zeppelin opinions would vary much more. Representatives of a younger generation of extreme metal fans (including bands such

as Emperor or Dimmu Borgir) would not probably call either of these "heavy metal", dismissing them as "old rock acts".[2] For some reason Black Sabbath's status as a heavy metal band seems to be generally accepted regardless of the listener's generation, whereas the categorisation of many of their contemporaries is much more contentious. On the effect personal listening habits or musical style preferences have on categorisation, Walser quotes Iron Maiden's lead singer Bruce Dickinson: "I wouldn't call UFO a heavy metal band, but if you happen to be a fan of Human League, they probably are. Moreover, if you're a fan of Motörhead, UFO aren't heavy metal. [… heavy metal is] a category" (*Musician* magazine, September 1984: 53; quoted in Walser 1993: 6–7).

Categorisation is not axiomatic for artists themselves. Bands that are generally considered to be heavy metal, may renounce their membership of that category while others claim to be – and take pride in being – the defining members of the genre; Led Zeppelin and AC/DC have rejected the term, whereas, for example, Judas Priest have claimed to be the definitive heavy metal band (cf. Walser 1993: 6). This reflects a peculiar characteristic that is common to rock music history in general. Musicians tend to identify themselves to a genre or musical category that they have been fans of. Classic heavy metal artists seldom use the term heavy metal. Ozzy Osbourne has often referred to his music as rock 'n' roll. For instance, in a self-portraying song he sings about a "Rock 'n' Roll Rebel" (*Bark at the Moon* 1984). The same goes for Ronnie James Dio, as demonstrated in the Rainbow album *Long Live Rock 'n' Roll* (1978). Furthermore, in a 1980 Black Sabbath concert Dio shows the hand sign known as "the horns" and proclaims that it means "long live rock 'n' roll (see *Black & Blue* concert DVD, 1998). In the autobiography of Motörhead's Lemmy Kilmister (2003) the term heavy metal is not used. Based on the evidence, it seems that all generation of musicians tends to refer to their music with genre labels that precedes their own – the music they have listened to. For instance, Eric Clapton of Cream was a fan of a 1930s Delta blues guitarist/vocalist Robert Johnson, and subsequently tends to refer to the "blues" when discussing Cream (see interviews in *Cream: Farewell Concert* VHS, 1968). Furthermore, Cream's bass player Jack Bruce has defined their music as "rock 'n' roll with blues in it" (interview in *Cream: Strange Brew* VHS, 1991). However, the band is often described by others in terms of blues-rock or psychedelic rock (e.g. Prown & Newquist 1997: 53; Garofalo 1997: 221).

As Weinstein (2000: 14) points out, there are also continental differences with respect to heavy metal histories. American writers often have a perspective in which European influences are seen as coming from outside and thus foreign. This is manifested in terms like "British invasion" (see e.g. Garofalo

2. As heard in recent comments by the author's undergraduate students.

1997: 200; Stuessy & Lipscomb 2006: 146; Prown & Newquist 1997: 27, 31) that is less often used by European scholars (cf. e.g. Moore 2001). Furthermore, in Britain and continental Europe there seems to be some kind of consensus that Black Sabbath was the first heavy metal band, whereas Americans tend to favour Led Zeppelin. This may be explained by the fact that before Black Sabbath had released their first album**,** Led Zeppelin had already had five American tours (see Tangye & Wright 2005: 35). Furthermore, most American critics did not think much of Black Sabbath, and were more tolerant of Led Zeppelin (Weinstein 2000: 14).

A subject for endless dispute among critics, fans and scholars is the question as to whether a particular band is "heavy metal" or "hard rock". Allan Moore (2004) sees hard rock as "an imprecise term, partly co-extensive with heavy metal". The term "heavy metal" is widely accepted in Britain but American critics have tried not to use the term too much (Weinstein 2000: 20). Instead, perhaps for political reasons, "they employ 'hard rock' within which heavy metal groups are included as a minor component with many others" (ibid.); heavy metal may, thus, be seen to be derived from hard rock as a subgenre (also see Walser 2004a). In fact, in many cases the two terms are treated as synonyms. The title of Dave Whitehill's (1989) tutorial article for *Guitar World* magazine presents a perfect case of this: the article is entitled "A Heavy Metal Primer – The Fundamentals of Hard Rock Technique". This is an unambiguous example of the two terms having a synonymous, or, at least, equal meaning. As in genre-labelling in general, however, one is usually forced to refer to elements outside the music in attempt to establish a difference between heavy metal and hard rock. For example, Moore (2004) among many others relies on the lyrics: "[In hard rock t]he subject matter of the songs emphasizes a misogynistic, macho sexuality and an unfocussed but often environmentally aware liberal politics. Hard rock, however, avoids heavy metal's leaning towards madness, violence and the occult." However true this may be, the distinction here is made by other than musical terms. Actually, it is quite possible that the distinction between the two cannot be made by musical terms alone. Elsewhere, Moore (2001:147–151) has attempted to find some musically significant distinguishing features, asking, for example, as "to what extent do the subtle differences between different brands of metal (about which fanatics make great play) equate to differences of musical style […]?" (ibid: 151). In spite of several important findings, some conclusions seem simplistic and even contradictory; perhaps because Moore implicitly emphasizes the role of heavy metal as a subgenre of hard rock. For example, Deep Purple is said to be hard rock and not heavy metal on the grounds that hard rock tends to favour an organ instead of a second guitar (ibid: 149). However, the underlying reason as to why the favouring of an organ over a second guitar should be a defining fea-

ture of hard rock appears to be that in Deep Purple there is an organ and not a second guitar. So it seems that it is first decided that Deep Purple is a hard rock and not a heavy metal band, and then the musical "factor[s] that serve to identify them" (ibid: 148) are used to support this pre-determined view. In fact, it is hard to find any reason why Deep Purple – or any other band that is frequently identified with both genres – should be labelled as hard rock and not heavy metal. To take this point a little further, if a keyboard is a determining factor, many of today's black metal bands should be labelled as hard rock, a view that is hardly shared among fans or musicians in the field.

In this study no effort is therefore made to differentiate between the two genre labels. In fact, the terms are very much used in parallel; if one writer calls something hard rock and something heavy metal, the next writer will probably do the exact opposite. Thus, all the music studied here is in some way labelled as "heavy metal". As stated earlier, the objective of this study is not to define exactly which bands are, or are not, heavy metal, but rather to explore some common features of the music that at some point in time has been called heavy metal. Only by doing this might it some day be possible to say what the basic *musical* features distinguishing heavy metal from other musical styles are. The question remains as to whether this kind of strict categorisation is ever possible or even relevant at all. Regardless of subjective preferences, "heavy metal" has become a common nominator term for a certain musical style much in the way that "rock" was a general term at the time of Woodstock for a diverse group of bands and music (cf. Weinstein 2000: 12). As already said, the usage of the term (and the terms) seems to be quite a personal matter varying from one individual to another. Here, because of this, the term is understood and used in a very broad sense. Thus, in the text, musical examples from the commonly accepted heavy metal canon of the 1970s and 1980s coincide with pre-heavy metal such as Jimi Hendrix and Cream of the late 1960s.

2.2. Cultural Background: The 1960s

Heavy metal was formed against the cultural background of the 1960s. Many of the themes significant to the decade were equally important to heavy metal. It was not only musical themes, but archetypical ideologies, aesthetics, and life-style ideals that were already present in one form or another. The hippie movement of the time had a major affect on Western societies, an ideology that was explicated in anthems such as the 1969 Woodstock festival's "peace, love and music". Considering the affect that the hippie movement had on heavy metal, the central themes can be summarised as 1) love, 2) peace 3) drugs, 4) mysticism, and 5) musical style. All of these were, and are, related to one another, and, appearing in varying forms, still form a substantial part of heavy metal.

The theme of love is a two-fold issue. On the one hand it co-existed with the theme of peace; all mankind should live in peace and harmony. On the other hand, the theme had far more carnal dimensions. The development of contraceptives liberated premarital sexual relations in a way that was completely new. If the rock 'n' roll of the 1950s was at the time perceived as sexually explicit and immoral (consider, for example, Elvis Presley's' nickname at the time: "Elvis the Pelvis;" e.g. Garofalo 1997: 137), the sexual liberation of the sixties was far more explicit and far reaching; this atmosphere of freedom influenced the lyrical content, and leaked as well into musical practices that sometimes were trying to simulate or at least express these types of ecstatic experiences or emotions. As a quite carnal example, Jimi Hendrix's stage performance sometimes included explicitly sexual motions with his guitar and/or amplifiers (see e.g. the performance of "Wild Thing" at the 1967 Monterey Pop festival; *Jimi Hendrix* documentary VHS, 1973). Heavy metal, among other styles, took up the explicitly sexual themes in lyrics and performance style. This is expressed in, for example, numerous song titles and lyrics such as in KISS's "Love Gun" (*Love Gun* 1977), Judas Priest's "Turbo Lover" (*Turbo* 1986), and WASP's "Animal: I Fuck Like a Beast" (1984), and in, expressive macho-sexuality in stage performance, interviews, and album covers (cf. Moore 2004, and *Metal – A Headbangers Journey* DVD, 2005).

The theme of peace has close links with the anti-Vietnam War and human rights movements. Popular music, mostly via lyrics, was also harnessed as a tool for promoting different political and sociological messages; until this, the main lyrical content of most mainstream popular music had usually been concerned with love in the politically correct sense. The new environment gave a major rise to the popularity of American folk singers. These artists were usually singer-songwriters who performed their own songs accompanying themselves most often on the guitar (e.g. Bob Dylan, Joan Baez). From a musical point of view the songs generally had rather simple melody-and-accompaniment structures, giving more emphasis to the lyrical than to the musical contents. However, some later artists were clearly influenced by such songs, covering them or their main ideas for their own compositions (cf. the so-called "power ballads" of the 1980s "lite metal" bands). Jimi Hendrix was a Bob Dylan fan, and frequently performed his songs (e.g. "All Along the Watchtower" and "Like a Rolling Stone"), but in a considerably different style. Led Zeppeling arranged "Babe, I'm Gonna Leave You" (*Led Zeppelin* 1969), a song made known by Joan Baez. In the late 1970s Judas Priest arranged another song made popular by Baez; "Diamonds and Rust" includes parts that significantly differ from the Baez version (*Diamonds and Rust* 1975; cf. Judas Priest's *Sin After Sin* 1977; *Unleashed in the East* 1979). Moreover, the band's name is adopted from a Bob Dylan song "The Ballad of Frankie Lee and Judas Priest" (*John Wesley*

Harding 1967) (Krusher 1999: 2).[3] The wistful atmosphere of the late 1960s was exemplified in anthems like the Beatles' "All You Need Is Love" (*Magical Mystery Tour* 1967). [4]

The ideal of "peace" that, at least in some nostalgic sense, had its culminating moments of glory in 1967 Monterey Pop and ultimately in 1969 Woodstock festival, was shattered some months later in the Altamont festival, when a youngster was stabbed to death during the Rolling Stones' performance (see e.g. documentary film *The Continuing Adventures of the Rolling Stones*, 1989; cf. Garofalo 1997: 231–237). Altamont may be considered as a point after which the faith in the goodness of mankind was no longer taken as self-evident – at least in rock circles. Subsequently, one of the main tenets of the hippie ideology was questioned. An apparently hippie group from Birmingham, UK, had a rather cynical and aggressive stance on war; Black Sabbath's "War Pigs" (*Paranoid*, 1970) was an anti-war anthem in a heavy metal style. As hippies, the early heavy metal musicians did express clear anti-Vietnam War attitudes. However, while the hippie response to violence was "peace and love", heavy metal expressed unmasked frustration and depression about mankind's evil deeds. "War Pigs" was probably one of the first anti-war statements that was aggressive in both musical and lyrical content, along with other contemporaries such as Jimi Hendrix (e.g. "Machine Gun", *Band of Gypsys* 1970). This change of expressive means is quite different from the hippie's faith in a better world, and a similar stance has been a part of heavy metal ever since (consider, e.g. Metallica's *Master of Puppets* 1986, and *…And Justice For All* 1988, or Megadeth's *Peace Sells, But Who's Buying* 1986).

The late 1960s was also a time of widespread mind-expanding drug use (e.g. Garofalo 1997: 217–222). Drugs, especially LSD, had a major impact on the ideologies of the hippie-counterculture, and, furthermore, on the music of bands such as Grateful Dead, Jefferson Airplane, and the Doors that at the time were called psychedelic, or, acid rock. "Psychedelic music was noted for its mysterious, drug-trip lyrics, and for the colourful clothes and lighting that marked its performances" (Weinstein 2000: 16). Psychedelic bands used drugs as a source of inspiration, so to speak, "getting in the mood", but also song

3. Alongside folk singers, the 1960s political movement in Finland initiated a different kind of protest song style, the music of which was fluid of jazz style chords and careful arrangements; see Rautiainen 2001. In musical sense, this might be compared to the Broadway hippie musicals, such as *Hair*, and *Jesus Christ Superstar*, although the melodies of Broadway musicals tend to be more mainstream, relying mostly on triadic chord tones and less on chord extensions.

4. Somewhat controversially, at the same time the band frequently appeared in brightly coloured military uniforms; see e.g. "I Am the Walrus", a surrealistic music video in the movie *Magical Mystery Tour*, or the cover art of *Sgt. Pepper's Lonely Heart's Club Band*, both 1967.

lyrics often dealt with drug-related issues (see e.g. Garofalo 1997: 218–227). The main purpose of psychedelic music is sometimes said to be to create the musical equivalent of an LSD trip (e.g. Weinstein 2000: 17). For instance, the Beatles were in the vanguard of this approach with albums such as *Revolver* (1966), *Sergeant Pepper's Lonely Heart's Club Band* (1967), and *Magical Mystery Tour* (1967). The popular slogan "sex, drugs, and rock and roll" that was linked to heavy metal culture in the 1970s, and particularly celebrated by glam metal bands in the 1980s, actually seems to have much of its basis in the hippie era. Furthermore, the drugs and/or alcohol related deaths of the major figures of the time (Janis Joplin and Jimi Hendrix in 1970, Jim Morrison in 1971), contributed to the celebration not only of drugs, but of early death as a way of becoming immortal. During the following decade other significant musicians were added to the statistics of untimely deaths, which further contributed to this myth of immortality. To name a few, Bon Scott (lead vocalist of AC/DC), Keith Moon (drummer of the Who), and John Bonham (drummer of Led Zeppelin) died drugs or alcohol deaths, and John Lennon (of the Beatles) was murdered. Taking a wider perspective, this phenomenon is not uncommon in music history more generally; the aforementioned may be compared to, for example, the early (and often not so glamorous) deaths of Mozart, Schubert, Mendelssohn, Gesualdo and Pergolesi.

The so-called New Age religions, mostly derived from Eastern cultures, were also a part of the hippie culture. A "finding your inner self" type of thinking found nice parallels with, not only in the ideals of peace and love, but also in mind-expanding drug use. Various forms of New Age religions and cults were popularized in the second half of the 1960s; again, the Beatles were in the forefront with their for-a-sometime *guru* Maharishi Mahes Yogi (see e.g. Everett 1999: 129). Oriental and ethnic references were popular in song titles, lyrics, and album covers. These were mixed with colourful psychedelic images (e.g. Jimi Hendrix's *Axis: Bold as Love* 1967), and wardrobe (see e.g. documentaries *Woodstock Diaries* 1994, and *Monterey Pop* 1967). In addition, original oriental music became somewhat popular. For instance, a famous *sitar* player Ravi Shankar was one of the performers in the Woodstock festival. The Beatles used sitar in several songs starting with "Norwegian Wood" (*Rubber Soul* 1965); in addition, "Love You To" (*Revolver* 1966), and "Within You Without You" (*Sergeant Pepper's Lonely Heart's Club Band* 1967) were arguably composed in North Indian style (Everett 1999: 40). Furthermore, in certain compositions Jimi Hendrix referred to "Indian influences" (Brown 1997: 160, 163). Mystical and oriental references have been a source of heavy metal vocabulary from the beginning. Led Zeppelin carried on with this tradition in the 1970s; Iron Maiden and Dio both applied Egyptian themes in the mid 1980s. Some bands, such as Black Sabbath and Mercyful Fate, have frequently used

Judeo-Christian based occult as a source of mystical references. Walser (1993: 152–160) sees this kind of pluralistic use of mysticism as common practice for post-modern art in general.

From a somewhat different perspective Weinstein (2000: 35–43) divides heavy metal's themes (mainly by lyrical content) into *Dionysian* and *Chaotic*. "Dionysian experience celebrates the vital forces of life through various forms of ecstasy. It is embodied in the unholy trinity of sex, drugs, and rock and roll." (Weinstein 2000: 35.) Themes of Chaos cover "strong emotional involvement that challenges the order and hegemony of everyday life: monsters, the underworld and hell, the grotesque and horrifying, disasters, mayhem, carnage, injustice, death, and rebellion" (ibid.). Although the main focus of this study is on musical aspects, this division of heavy metal themes needs commenting upon, because of some fundamental differences in view between myself and Weinstein. It seems to me that the five hippie themes suggested above occur in heavy metal in various altered forms. Weinstein might put the aggressive anti-war expressions of, for example, "War Pigs" or Metallica's "Blackened" (*…And Justice for All* 1988) in the category of Chaos, whereas they could more readily be interpreted as expressions of the theme of peace. Although expressed in a frustrated and straight-forward manner, these songs strive to question the justification of warfare; the lyrics comment on wars in Vietnam and Persian Gulf, respectively. Furthermore, various references to mysticism, occult, and fantasy are easily understood within the basic frameworks of hippie mysticism or New Age religions.

It is all too easy to conclude that the hippie theme "love" was replaced by "evil" in heavy metal (as suggested by Weinstein 2000: 18), and even easier to find extreme examples to support this. However, at least with traditional heavy metal, it seems to me that the themes of love, peace, and mysticism appear quite clearly, albeit in altered forms: love more explicitly carnal, desire for peace includes frustration, and mysticism includes fantasy, Judeo-Christian occult and Scandinavian mythology. Moreover, if the popular hippie anthem was the Woodstock slogan "peace, love, and music", the general practice of the musicians and audiences of the time could as well be described as "sex, drugs, and rock 'n' roll" – well before the heavy metal music that, especially in the 1980s, took much of the blame.

2.3. Heavy Metal Eras

The numerous ways of genre labelling are based on rationales that vary according to a particular scholar's point of view and the object of their study. Furthermore, journalists follow their own logic. The genre diagram in Table 2.1 represents the author's view on the genealogy of early heavy metal. According to

the priorities of this study, particular attention is paid to so-called traditional or classic heavy metal; the era that is preceded by psychedelic and blues rock groups of the late 1970s, and ranges roughly from the early 1970s to the mid 1980s (encircled with a double bold line in Table 2.1). The subcategories before the fragmentation of the 1980s are labelled as Early Heavy Metal, the "golden age", and the New Wave of European Heavy Metal. Depending on the point of view, any of these eras could be, and have been, called "golden" or "classic" (cf. Christe 2004: 70; Weinstein 2000: 21; Walser 1993: 11).

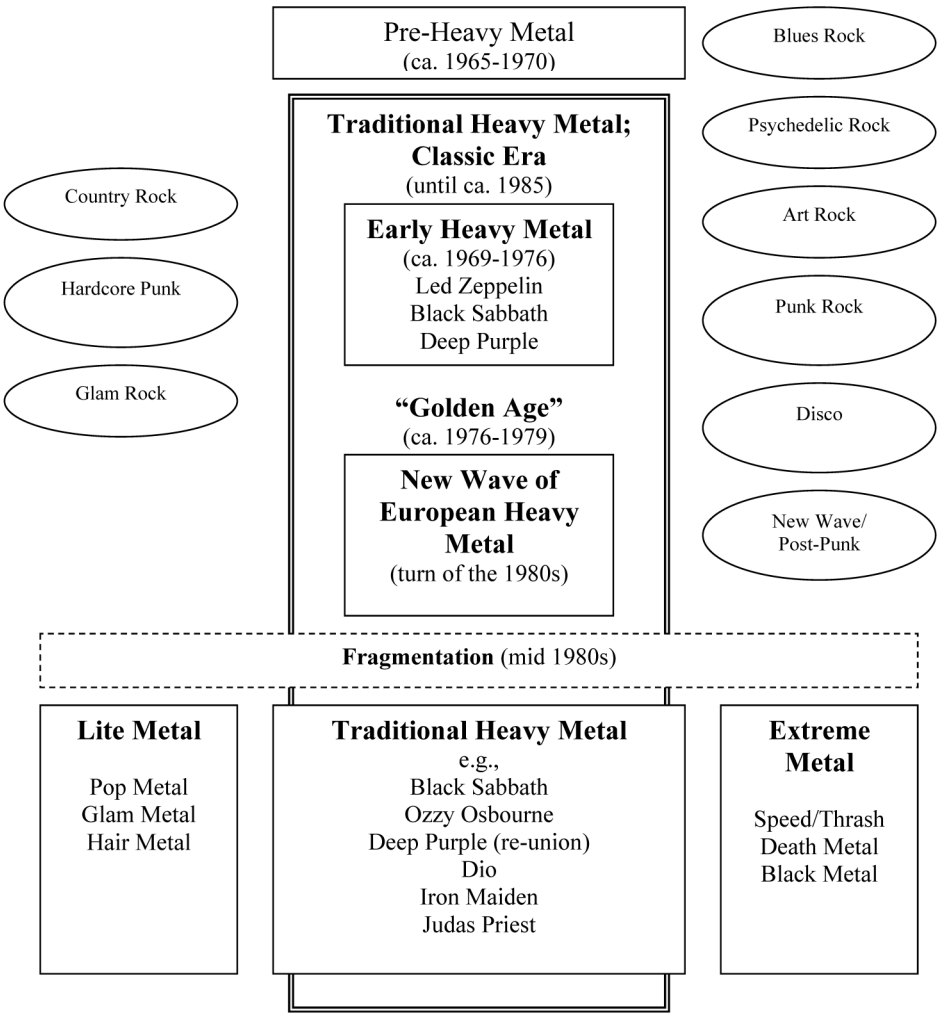


Table 2.1. A genealogy of heavy metal from the mid 1960s until the fragmentation of the genre in the early 1980.

2.3.1. Pre-Heavy Metal – Musical Roots

According to Weinstein (2000: 15), "heavy metal's predecessors form an amalgam of different styles and specific rock bands". The pre-heavy metal era (ca. 1965–1970) entails bands in the 1960s that incorporated some heavy elements into their music. A time period starting from the first visit of the Beatles to the US in 1964 is sometimes called the "British invasion" (e.g. Prown & Newquist 1997: 27; Garofalo 1997: 200–209). The Beatles and the Rolling Stones, among others, had been listening to and playing American pop and rock 'n' roll music, such as Elvis Presley and Chuck Berry. However, "[b]y the late 1964, British beat/r&b bands seemed to be asserting a great degree of stylistic independence from their US rock 'n' roll forebears (Moore 2001: 71). Musical features were moulded and mixed with other styles. While the Rolling Stones usually kept more to the bluesy roots of rock 'n' roll, the Beatles added diverse stylistic elements such as vocal harmonies of Motown girl groups (e.g. Valdez 2002: 98; Moore 2001: 71). For instance, for their second album *With the Beatles* (1963) they covered Chuck Berry's "Roll Over Beethoven" as well as the Marvelettes' "Please Mr. Postman" (see e.g. Everett 2001: 195; 52, 185–186). One particularly important aspect of their influence on popular music is the emphasis placed on compositional innovation and technique. During the 1960s the Beatles' output consisted of musical pieces in almost any imaginable style.[5] Many stylistic features of British bands appeared later in heavy metal; modal and major/minor tonal alongside bluesy elements. For instance, variations of a chord pattern in "I Saw Her Standing There" (*Please, Please Me* 1963) (Example 2.1) are frequently used; the pattern itself is common in earlier styles, such as parlour music and ragtime (see Chapter 5.4.3).

E – E7 – A – C – E – B7 – E

Example 2.1. Chord pattern in "I Saw Her Standing There".

Robert Walser (1993: 9) says that "heavy drums and bass, virtuosic distorted guitar, and a powerful vocal style that used screams and growls as signs of transgression and transcendence" were a contribution of the 1960s blues-rock bands to heavy metal. However, late 1960s bands in general used a heavier beat, a rougher guitar sound and a more aggressive vocal style than before. The Beatles, even, "hinted at heavier things to come with guitar-based rockers like 'Paperback Writer' and 'Taxman'" (Prown & Newquist 1997: 59). The Beatles'

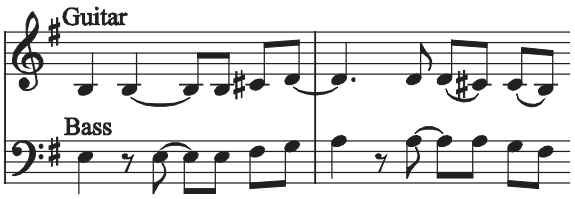
5. George Martin's numerous arrangements for the Beatles have to be mentioned here, as well as experiments in the field of art music (cf. e.g. "Revolution 9" [*White Album* 1968] to Karlheinz Stockhausen's electro-acoustic compositions in the fifties and the sixties).

song that most obviously has features in common with heavy metal must be "Helter Skelter" (*White Album*, 1968) – a song that was later covered by a Los Angeles based glam metal band Mötley Crüe (*Shout at the Devil*, 1983). The original version uses a heavy, steady beat in the drums, highly distorted guitar, and vocals that are delivered in what is almost a shouting style. The song was written by Paul McCartney, who was motivated by trying to be louder and more raucous than the Who (Everett 1999: 191). The chords in the verse are the same as in Jimi Hendrix's "Purple Haze" (Example 2.2; cf. Example 4.4.5 in Chapter 4.6.2.).

E7♯9 (10 bars) G (2 bars) A (2 bars) E7♯9 (2 bars)

Example 2.2. Chords for the verse of "Helter Skelter".

Riffs – short musical passages that are repeated constantly – are particularly important compositional tools for heavy metal (see Chapter 5.1.1); they became very prevalent in the 1960s. The Kinks released two hit singles in 1964 that were based on power chord riffs: "You Really Got Me" and "All Day and All of the Night" (see Prown & Newquist 1997: 59). The former was later covered by an American heavy metal band Van Halen (*Van Halen* 1978). In 1965 the Who released "My Generation", which was based on a similarly repetitive power chord pattern. The bands also influenced each other. Dave Davies of the Kinks recalls that "Ray [Davies, the main songwriter of the Kinks] has influenced a lot of [the Who's] Townshend's compositions" (Forte 1977: 53). In the same year the Rolling Stones released "Satisfaction", including one of the most famous riffs of the era, in which a heavily distorted guitar riff is accompanied by a relatively independent bass line (Example 2.3).



Example 2.3. Riff to "Satisfaction"

According to Weinstein (2000: 16) the two styles that made a major contribution to early heavy metal were blues rock and psychedelic rock. Blues rock bands of the late 1960s included, for example, John Mayall's Bluesbrakers, Cream, Johnny Winter, Blue Cheer, and the Yardbirds, who are particularly

interesting. The band worked as a high school for three major figures for the future of heavy guitar playing: Jeff Beck (later in Jeff Beck Group), Eric Clapton (later in Bluesbrakers and Cream), and Jimmy Page (later in Led Zeppelin). Besides the Yardbirds, the Who, Cream, the Jeff Beck Group, and Jimi Hendrix Experience, are said to be the major contributors to the formation of heavy metal (Walser 2004a; 1993: 9; Obrecht 1984: 8). They "developed a more distorted guitar sound and heavier drums and bass that led to separation of heavy metal from other blues-based rock" (Walser 2004a). This included some modification of musical vocabulary of earlier blues artists, such as Robert Johnson, Muddy Waters, Howlin' Wolf, and B. B. King. For instance, the performance style of Robert Johnson, who only performed solo, was translated suitable for the rock band. Distortion and volume were added, but also the musical form was made to fit in the requirements of ensemble playing (cf. Headlam 1997: 69–72). In short, when playing solo it is possible to work freely with the chords, melodies, bar-lengths and so on, but when playing in a group, it all has to be more pre-arranged and organized.

Late 1960s blues rock also has ties to jazz.

> Hendrix and Cream introduced some jazz elements, foremost among them extended instrumental solos, into their mix of blues rock. Heavy metal derived its basic song structure, its fundamental chord progressions, and its guitar riffs from the blues-rock tradition. Virtuoso lead-guitar techniques were a major legacy of blues rock to heavy metal. (Weinstein 2000: 16.)

Weinstein seems to neglect the fact that many blues rock musicians were actually quite actively involved with jazz; it is probable that jazz influences appear in other parameters of music as well. Jack Bruce and Ginger Baker, bassist/singer and drummer, played with Graham Bond's jazzy group before forming Cream with Clapton (see e.g. interviews with the band members in the documentary *Cream: Strange Brew*, 1991). Jimi Hendrix was planning some recording sessions with jazz arranger Gil Evans; although, Hendrix died just before this was realized (Menn 1984: 17). Furthermore, Black Sabbath started out as a peculiar jazz/blues band before transforming into a heavy metal band (Tangye & Wright 2005: 29; Prown & Newquist 1997: 64). Jazz influences may still be heard in, for example, the guitarist Tony Iommi's frequent use of quartal chords (see Chapter 5.1.5). More importantly, complicated song forms and frequently changing time signatures are common in late 1960s fusion jazz and early heavy metal. For example, "Stuff" by Miles Davis (*Miles in the Sky* 1968) and Black Sabbath's "Behind the Wall of Sleep" (*Black Sabbath* 1970) share these features. Moreover, the practice of collective improvisation, which is common in all post-bebop jazz, was significant in blues rock and early 1970s heavy metal. Jimi Hendrix's live performances (e.g. *Jimi Hendrix* documenta-

ry, 1973) and Cream's *Farewell Concert* (VHS, 1968) serve as examples as well as Deep Purple's "Wring that Neck", "Mandrake Root" (*Scandinavian Nights: Live in Stockholm 1970*, 1988) and "Space Truckin'" (*Deep Purple: Live at the California Jam 1974* DVD, 2005).

In the late 1960s many bands were considered as representatives of both blues rock and psychedelic rock (e.g. Cream, the Who, and Jimi Hendrix), which shows that the two genres were closely tied together. For instance, in a 1967 performance at the Marquee Club, London, "Purple Haze" was introduced as "psychedelic sounds by Jimi Hendrix Experience" (*Jimi Hendrix* documentary, 1973). One feature in psychedelic music is particularly important to much heavy metal:

> Acid rock was aimed not at one's legs or crotch, but at one's head. It wasn't dance music. Getting lost in the music was "getting" the music. This ecstatic use of music was taken up by heavy metal. (Weinstein 2000: 17).

The direct connection of psychedelic rock to heavy metal is noted by several authors. According to Will Straw (1990: 97) "[t]he decomposition of psychedelic music, in the late 1960s, followed three principal directions". In short, these were country rock in the US, art rock in UK, and heavy metal in both. Heavy metal retained from psychedelia "an emphasis on technological effect and instrumental virtuosity" (Straw 1990: 97). In the 1970s there are numerous examples of this. Lemmy Kilmister was in a psychedelic band Hawkwind before founding Motörhead in 1976 (see e.g. Kilmister 2003). Judas Priest started as a psychedelic band in the late sixties, but changed their style to heavy metal in the mid seventies (e.g. Weinstein 2000: 17). Deep Purple was a similar case; the late sixties albums could be described as psychedelia, but the early seventies[2] albums are clearly heavy metal. Uriah Heep has been described as both psychedelic rock and heavy metal in the early 1970s; so has been one of the most important 1970s art rock bands Pink Floyd (Weinstein 2000: 17–18).

Despite the common misconception, supported and popularized by drugs and alcohol related deaths, the era of psychedelic rock was not all about drugs: the fast technical development in music recording and producing made it possible to realize the new and revolutionary musical ideas. Weinstein does note the general importance of psychedelic rock, but she does not consider its musical significance to the musical structures of heavy metal, and hence one may get an impression that the music was not that important. Actually, despite of bands that were more drug than music oriented, the craft of composition and instrumental technique was crucial to much psychedelic rock. For instance, even if live performances might be rather different, including collective and often unplanned improvisation, the studio albums of Cream, Jimi Hendrix

and the Doors were always carefully arranged, executed and produced. Furthermore, the Who's so-called rock operas (*Tommy* 1969; *Quadrophenia* 1979) can be understood as concept albums, the tradition that was launched by the Beatles's *Sergeant Pepper's Lonely Heart's Club Band* (1967) and continued amongst a number of heavy metal bands (nowadays perhaps most consistently by King Diamond).

2.3.2. Traditional Heavy Metal: Classic Era

Early Heavy Metal

Like many other features in the history of the genre, the title of first heavy metal band is much disputed. Popular heavy metal histories usually start out with Black Sabbath as the originators of the genre (e.g. Christe 2004: 1–5). This view is understandable in its simplicity – Black Sabbath was (and is) undeniably the band whose influence is visible and audible throughout the four-decade history of heavy metal. However, the issue is certainly more complex. Led Zeppelin is also often acknowledged as the "the first true metal band" (e.g. Prown & Newquist 1997: 59–60, Russ 2004); "the first real heavy metal hit" is said to have been Jimi Hendrix's "Purple Haze", in 1967 (Walser 1993: 9; Obrecht 1984: 13); some include bands like Blue Cheer and Steppenwolf (cf. e.g. Weinstein 2000: 19–20; *Metal – A Headbanger's Journey*, 2005). Opinions of pioneering artists vary, too. In an interview for the documentary film *Cream: Strange Brew* (1991) Eric Clapton says about Cream: "I think it's one of the early heavy metal bands, probably, without knowing it. When we disbanded Cream […] Led Zeppelin filled the void; they became the first official heavy metal band." Interviewed for a documentary film *Metal – A Headbanger's Journey* (2005), Motörhead's Lemmy Kilmister gives the title of the first heavy metal band to Deep Purple, Rush's Geddy Lee to Blue Cheer, and Alice Cooper to his own band, whereas artists of younger generation (Rob Zombie, Cannibal Corpse, and Lamb of God) unanimously accredit Black Sabbath in interviews. On the other hand, Black Sabbath's guitar player Tony Iommi himself says:

> When I first heard the term heavy metal I didn't have the faintest idea what we were talking about, which was many years ago […] I was doing an interview and somebody said "that's heavy metal", and [I said] "what? What's that?" […] (ibid.).

Whereas Weinstein (2000: 15) calls Black Sabbath and Led Zeppelin the founders of heavy metal, Walser (1993: 10) names three genre-codifying albums: Led Zeppelin's *Led Zeppelin II* (1969) Black Sabbath's *Paranoid* (1970) and Deep Purple's *In Rock* (1970). In this study these bands are called early

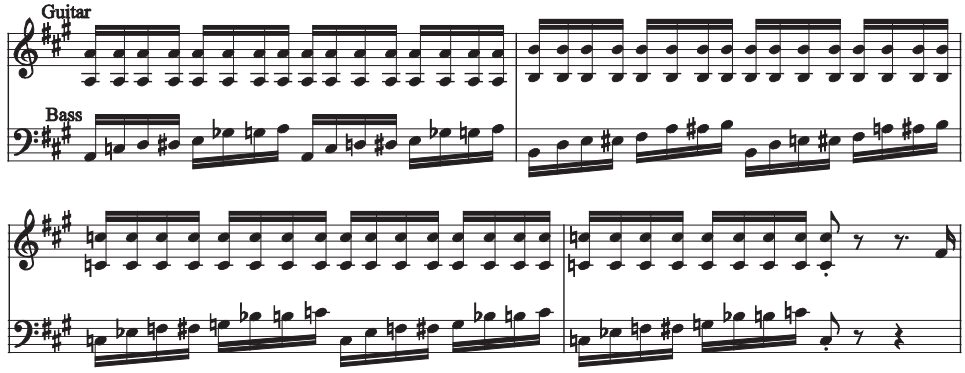
heavy metal with the addition of Uriah Heep, which due to heavy guitar riffs, distorted Hammond organ and falsetto vocals qualifies as a heavy metal band as much as Deep Purple. "Classic" or "traditional" heavy metal was launched by these bands at the turn of the 1970s.

Regarding musical style, there are similarities, and also differences between the four. In general, all employ high volumes with heavy riffs that are usually executed with distorted guitar. Ensembles feature guitar, bass, drums and vocals, with the addition of Hammond organ in Deep Purple and Uriah Heep. The organ is usually distorted, and in some cases such as Deep Purple's "Fireball" (*Fireball* 1971), the bass, too. Vocal style is generally high pitched tenor, frequently employing falsetto. Still, there are exceptions to the rule; Uriah Heep's lead vocalist David Byron usually stays within lower baritone pitch and leaves the piercing falsetto singing to the organist Ken Hensley. Unlike the other three groups, for Uriah Heep vocal harmonies form a significant part of compositional style. Deep Purple's Ian Gillan and Led Zeppelin's Robert Plant clearly derive much of their vocabulary from earlier blues and rock 'n' roll. For instance, Gillan's singing in "Speed King" (*In Rock* 1970) significantly resembles the gospel-influenced vocal style of Little Richard; Deep Purple frequently covered Little Richard songs such as "Lucille" (see e.g. *Live in Denmark 1972* concert video, 1990). Both Gillan and Plant use a lot of vocal embellishment that is common in gospel-derived styles (cf. e.g. Ray Charles, Sam Cooke) and various forms of the blues (e.g. Robert Johnson, Billie Holiday). Many of their melodies are build around pentatonic scales with frequent blue notes, whereas Black Sabbath and Uriah Heep employ modal scales with a tendency towards tempered tuning. The reason for this may be found in compositional practise. For the most part, Gillan and Plant rely much on their bluesy background and supposedly have written most of their vocal parts (see Bloom 2006: 125, 130; Fyfe 2003: 34–35), whereas Uriah Heep's material was mostly written by the organist Hensley. In Black Sabbath the compositional work was usually done by the guitarist Iommi and the bassist Geezer Butler (Tangye & Wright 2005: 25). Furthermore, the vocal timbre of Black Sabbath's Ozzy Osbourne and Uriah Heep's Byron and Hensley is not as rough as that of Gillan and Plant.

The drummers, like their colleagues at the time, did not solely rely on a steady back beat on the bass and snare drum. Like their contemporaries such as Ginger Baker (of Cream), Keith Moon (The Who) and Mitch Mitchell (Jimi Hendrix Experience), they used the whole set in more complicated way. Jazz influence can be seen in much early heavy metal drum work. The drummers' connection to jazz was noticed at the time, too: "Bill Ward [the drummer of Black Sabbath], who is a musical rarity – a drummer who writes songs – digs big bands and swings like mad" (Tangye & Wright 2005: 24).

The guitar style is generally virtuosic. Blues scales and minor modes dominate the riffs and solos. Power chords are used extensively. Other structures such as triads and tetrads are also used, but mostly without distortion. However, there are exceptions. For instance, distorted tetrads are found in Led Zeppelin's "Immigrant Song" (*Led Zeppelin III* 1970), Deep Purple's "Strange Kind of Woman" (*Made in Japan* 1972), and Black Sabbath's "Fairies Wear Boots" (*Paranoid* 1970). Each guitarist developed an individual style following the guitar hero tradition of psychedelic blues rockers such as Jimi Hendrix, Eric Clapton and Pete Townshend. The guitar hero tradition may well have made it difficult to allow a fellow guitar player to appear, inevitably as a competitor, within a band. For this reason, perhaps, in early heavy metal bands there is only a single guitar player, whereas earlier British groups (e.g. Rolling Stones, the Beatles) had two. Another reason might be the development of amplification that allowed one guitar to achieve a fuller sound than what was possible in the mid 1960s.

Being merely a time-keeping instrument until the early 1960s, the bass achieved a different, more independent function in rock – much due to the influence of Motown records and its house band the Funk Brothers (Fyfe 2003: 24). In early heavy metal and throughout the 1970s, bass playing took up this legacy adding melodic elements besides the rhythmic to the music. Bass often follows guitar riffs from note to note as in pieces such as Black Sabbath's "Iron Man" (*Paranoid* 1970) or Led Zeppelin's "Black Dog" (*Led Zeppelin [IV]* 1971). However, just as often it has independent lines, or licks that fill up or comment on guitar part as in Led Zeppelin's "Immigrant Song" (*Led Zeppelin III* 1970). Here, the bass line has an overt melodic function greater than the guitar in its fast, jazzy walking-bass through extended minor blues scales (Example 2.4). Much of the contrapuntal independence of the bass was dropped in the 1980s, when its role was reduced merely to the lowest note in the harmony.



Example 2.4. Guitar and bass parts from "Immigrant Song".

If something was added to the basic guitar-bass-drums ensemble, it was keyboards. Keyboard players in Deep Purple and Led Zeppelin both had formal training, which included learning how to read and write music. John Paul Jones had a career as an arranger before joining Led Zeppelin to play bass and keyboards (Fyfe 2003: 25–27). Similarly, in 1969 Jon Lord composed *Concerto for Group and Orchestra* (VHS, 1984) for Deep Purple and the Royal Philharmonic Orchestra in only three months (Bloom 2006: 128). Keyboard parts often add classical-sounding elements to the whole (see Chapter 5.3). This is not only through musical education, but also as a result of typical instrumental techniques; even if Uriah Heep's Ken Hensley was musically self-educated, his playing frequently recalls the characteristic practices of classical keyboard (see e.g. organ part of "July Morning" in Chapter 5.3).

The style of arrangement in general is very careful in parts, but often includes sections of collective improvisation, or "jamming", where all the players do more or less what they feel like at the time. This forms yet another parallel with psychedelic music. For instance, one may compare the 1968 live performance of "The End" by the Doors (*The Doors: Dance on Fire* VHS, 1985) to Deep Purple's "Space Truckin'" (*Deep Purple: Live at the California Jam 1974* DVD, 2005). Both include an extended improvisational section that is seemingly chaotic. However, there is a high degree of control involved in this type of musicianship. For example, jamming in "Space Truckin'" is ended with Ritchie Blackmore's hand wave, and the band swiftly returns to a common theme. Compared to earlier or later rock music, early heavy metal compositions often had rather complex form structures. This may be noticed in lengthy anthems such as Deep Purple's "Child in Time" (*In Rock* 1970), Uriah Heep's "July Morning" (*Look at Yourself* 1970), and Led Zeppelin's "Stairway to Heaven" (*Led Zeppelin [IV]* 1971). For Black Sabbath complexity was more the rule than the exception; most of their early compositions are constructed from contrasting sections that often have differing time or key signatures (e.g. "War Pigs", "Electric Funeral", and "Hand of Doom" from *Paranoid*, "Beyond the Wall of Sleep" from *Black Sabbath*, and "Wheels of Confusion" from *Vol. 4*).

"The Golden Age"

Weinstein (2000: 21) calls the period between ca. 1976–1979 "the golden age of heavy metal", This seems to be at odds with her sociological standpoint, since it was only in the 1980s when heavy metal came immensely popular (see Walser 1993: 3, 11–16). In the later part of the 1970s, heavy metal was surpassed in popularity by other styles, most importantly punk rock and disco. On the grounds of record sales this may be thought as a less important phase in its history. It is also surprising that Walser (1993: 11) takes this position, given

his musicological standpoint. However, heavy metal was now unambiguously thought as a musical genre (Walser 1993: 10), and in terms of the development of the musical style, heavy metal was now matured or "crystallized" (e.g. Weinstein 2000: 21; cf. Prown & Newquist 1997: 164). In spite of competing genres, the late 1970s was in fact a very active time period for heavy metal. Touring was intensive and a large proportion of the records that are still considered classics were produced (cf. Popoff 2004: 415–425). In 1975 guitar player Ritchie Blackmore quit Deep Purple (which disbanded soon after) and instantly formed Rainbow (see e.g. Prown & Newquist 1997: 65). With a line-up including Ronnie James Dio on vocals, Rainbow released classic albums including *Rainbow Rising* (1976), *On Stage* (1977), and *Long Live Rock 'n' Roll* (1978), touring in Europe, America and Japan (Robinson 2006). By 1975 Led Zeppelin had come "bigger than ever" (Fyfe 2003: 170–171), and their popularity intensified with the 1976 movie *The Song Remains the Same*, which included documentary and concert material from the 1973 American tour. Black Sabbath recorded actively and sold full concert halls in Europe and America (Tangye & Wright 2005). In discussing the end of the decade Black Sabbath's road crew members assert that "[h]eavy rock was definitely alive and well in the summer of '78" (Tangye & Wright 2005: 211).

During the first decade of its history European and American heavy metal developed towards different directions.

> *Metal Rendez-Vous* [magazine] editor John Strednansky [no detailed reference] points out that since Hendrix's time, British and American heavy metal guitarists have developed different approaches: "The British rely on a lot of riffs. The songs are structured around crashing guitar sounds, and the vocals are of secondary importance. The stronger the riff, the more important the song. In America, it's the other way around. The vocals carry the song, and the riffs are there to enhance them. American heavy metal sounds more polished because of this emphasis on the melody and voice. (Obrecht 1984: 8.)

This may be explained by the development noted by Straw (1990: 97). In America the tendency in post-psychedelic music was towards simpler and more vocal-based country rock, whereas in Britain it was towards art rock. Early heavy metal, as it is seen here, was ultimately British, and in its early phase was closely related to art rock. Throughout the 1970s, song forms are often complex, with more or less direct influences drawn from art music. Indeed, it is misleading to refer to many classic heavy metal compositions as "songs", because the main compositional elements are not in the vocals but in other instruments, and, moreover, in the overall interaction of all the instruments.

The New Wave of European Heavy Metal

Towards the end of the 1970s the "golden age" was coming to some sort of an end. Pioneering groups either disbanded or experienced other major changes. The lead vocalist Ozzy Osbourne left Black Sabbath in 1979 soon after the band's ten years anniversary tour (supported by Van Halen), and was replaced right away with the former Rainbow vocalist Ronnie James Dio (e.g. Tangye & Wright 2005: 208–228). Led Zeppelin disbanded in 1980 as a result of the drummer John Bonham's death (e.g. Fyfe 2003: 183). In spite of more successful musical styles of the time "performers such as AC/DC, Judas Priest, Kiss and Alice Cooper toured incessantly with elaborate stage shows, building a fan base for an internationally-successful style" (Walser 2004a). Also bands such as Queen, Van Halen, Motörhead, and Scorpions added something of their own to the genre (e.g. Christe 2004: 18–22; Prown & Newquist 1997: 104–115, 164–172). In general, however, "popularity waned at the end of the decade, but the early 1980s brought the 'new wave' of British heavy metal to revive the genre" (Walser 2004a).

Although some claimed that heavy metal "had had it" (cf. Walser 1993: 11), heavy metal underground was still fairly strong in Britain and the rest of Europe. Many bands that had been active during or since the late 1970s (e.g. Motörhead, Saxon, Def Leppard, and Judas Priest) contributed to the formation of a new subgenre. "Bands like Iron Maiden and Motörhead exported very different styles of music, but they all were experienced as a wave of renewal for the genre of heavy metal" (Walser 1993: 12). This diverse group of bands was to be called the "new wave of British heavy metal" (with its common abbreviation, NWOBHM; e.g. Russ 2004). Judas Priest's album title *British Steel* (1980) most clearly relys on this new genre label. The term adopted here for this time period is, however, the "new wave of European heavy metal", as suggested by Prown & Newquist (1997: 182). The reason for this is that many influential groups that would easily fall under the same heading were formed in other parts of Europe as well, for instance, Accept, Scorpions and UFO in Germany and Krokus in Switzerland. Many bands of the new wave are still (or again) active.

Although the predominant compositional elements remained the same, during the 1970s some bands modified heavy metal into a more accessible form in order to please a wider audience. In musical terms this meant simpler and more pre-arranged form structures that contrasted with the relative complexity and level of improvisation in earlier styles.

> For the most part the new wave of metal featured shorter, catchier songs, more sophisticated production techniques, and higher technical standards.

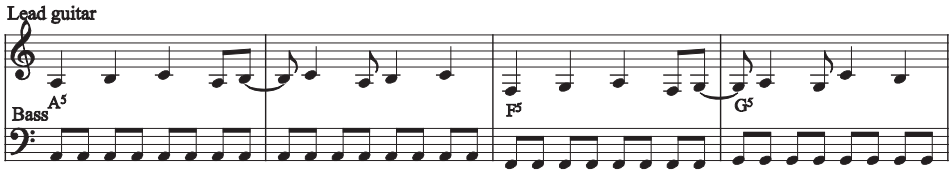
> All these characteristics helped pave the way toward greater popular success. (Walser 1993: 12.)

Comparisons between the musical style of Deep Purple or Black Sabbath with that of Scorpions or Motörhead serve as an example. Moreover, the stylistic differences in Judas Priest's television performances of the mid and the late 1970s are significant in this matter (cf. e.g. "Dreamer/Deceiver" and "Evening Star" in *Electric Eye* DVD, 2003). When it comes to the clearly simpler musical structures of the late 1970s onwards, it is easy to see the influence of two popular genres of the time – punk rock and disco music.

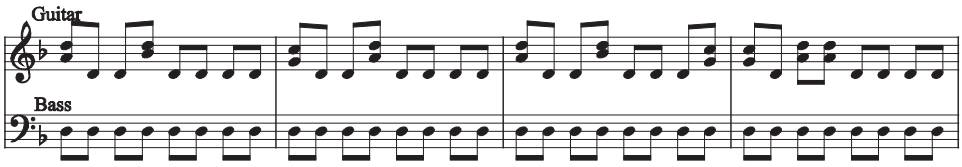
However, in compositional terms many of the NWOEHM bands included both simple and complex song forms. For instance, Motörhead, who frequently played for both punk and metal audiences, generally used rather simple verse/refrain song structures. On the other hand, Iron Maiden's compositions were usually constructed from a number of individual sections that could include varying metre and key changes. "Phantom of the Opera" (*Iron Maiden* 1980) is a good example of this as well as "Aces High" (*Powerslave* 1984) (cf. analysis in Chapter 5.2) Judas Priest frequently used both types of organization – complex forms that relate to early heavy metal and psychedelic music as well as rather simple songs; the latter perhaps with wider commercial success in mind. Comparison between "Victim of Changes" (*Unleashed in the East* 1979) and "Breaking the Law" (*British Steel* 1980) exemplify this. Careful arrangement and performance was common to the bands of the new wave, as with other genres of the time. For instance, the arrangement of Judas Priest's "Evening Star" (*Killing Machine* 1979) differs little from that of the BeeGees. Live Performances often closely followed the arrangement, with the songs and compositions performed almost unchanged every time. Even guitar solos are pre-composed rather than improvised. For instance, Deep Purple's live versions in *Made in Japan* (1972) or *California Jam 1974* (DVD, 2005) are certainly different from the studio cuts. Collective improvisation and the bending of song forms clearly reflect the conventions of blues rock and psychedelic rock. Compared to this, Iron Maiden's live performances in the 1985 album *Live After Death* differ little from the original studio recordings. The role of improvisation, if there is any, is restricted almost exclusively to guitar solos, whereas in the 1970s all the musicians in the band typically joined in – frequently all improvising together. This is a common feature to most heavy metal after NWOEHM. However, extended guitar solo breaks during which the other musicians either back up the soloist or wait in silence, were a feature already apparent in Ritchie Blackmore's Rainbow in the late 1970s (see e.g. *Live in Munich 1977* DVD, 2006) and a significant part of Black Sabbath's performance style from the beginning (see e.g. *Black Sabbath in Concert* 1970 DVD, 2004, and, *Never Say Die* 1978 con-

cert VHS, s.a.). Now this became the common practice, replacing more flexible forms of performance.

A further difference to the 1970s is the use of two guitars instead of one, which became standard in 1980s heavy metal ensembles. For instance, Iron Maiden, Accept and Judas Priest developed a two-guitar arrangement style, in which the guitars complement each other by, for example, using different inversions for the same chord (see e.g. Stix 1982: 33). Having two guitars harmonizing a melody or a riff is also common. Early heavy metal bands that were still active, such as Black Sabbath, and their offshoots such as Dio and Ozzy Osbourne included keyboards. However, in these cases keyboards mostly functioned as a static background element without a significant thematic role. Furthermore, in album credits keyboard players are often in small print, and in live situations hidden behind the stage as in Black Sabbath's 1980 concert (see e.g. *Black & Blue* concert DVD, 1998). Moreover, the role of the bass is rather different than in the 1970s. For the most part, it serves merely as a lowest note of the harmony as in Judas Priest's "Breaking the Law" (*British Steel* 1980; Example 2.5) or as a drone as in Accept's "Balls to the Wall" (*Balls to the Wall* 1983) or "Princess of the Dawn" (*Restless and Wild* 1982; Example 2.6).



Example 2.5. Riff to "Breaking the Law" (ca. [0:02–0:10]).



Example 2.6. Riff to "Princess of the Dawn" (ca. [0:08–0:15]).

2.3.3. Fragmentation and Reflections

Besides stylistic features such as the move towards pre-arranged music, the new wave of European heavy metal had other significant influences on the genre in general. The new wave launched a huge upsurge in world-wide popularity (cf. Walser 1993: 12). In the wake of the European new wave "the next new

wave of metal came out of Los Angeles, around 1983–1984" (Walser 1993: 12). During the 1970s guitar technique had taken a leap forwards. Aided by new technical developments and musical perspectives, players such as Eddie Van Halen, Yngwie Malmsteen and Randy Rhoads (of Ozzy Osbourne) developed new guitar techniques such as tapping and hammer-on/pull-off (e.g. Prown & Newquist 1997: 164–169). Following the lead of earlier musicians and composers in the genre, they further incorporated material derived from classical music into their vocabulary (see e.g. Walser 1992). An important point on the technical side was the establishment of formal education. In the mid 1980s the Guitar Institute of Technology (GIT) was founded in Los Angeles, followed by similar institutes for bass players (BIT), vocalists (VIT), and percussionists (PIT). "Instead of slaving away in solitude like Eddie Van Halen or Randy Rhoads, young hotshots copied licks from a chalkboard, studied flashy stage tricks, and for final exams played showcase gigs to label scouts" (Christe 2004: 161).[6] Although the main musical elements of metal were now more or less fixed, the fast growing number of bands inevitably led to a fragmentation of the genre that effectively ended the classic era. Towards the end of the 1980s heavy metal was the most successful subgenre of rock, if measured in, for example, record sales and later on in MTV viewer statistics (Walser 1993: 12–13). As it grew in popularity, heavy metal fragmented into an increasing number of different subgenres as the result of musical and ideological diversity. In the 1980s this led to the formation of three major subgenres that may be categorised as "traditional", "lite", and "extreme" metal.

> The 1980s brought on the one hand a wave of gender-bending, spectacular 'glam' metal from bands such as Poison and Mötley Crüe, and, on the other hand, the widespread adaptation of chord progressions and virtuosic practices from 18th-century European models, especially Bach and Vivaldi, by influential guitarists such as Van Halen, Randy Rhoads and Yngwie Malmsteen. Heavy metal was the most popular genre of rock music worldwide during this decade, even as harder underground styles developed in opposition to the pop-oriented metal of groups such as Bon Jovi. (Walser 2004a.)

The traditional strain of metal never ceased to exist. Many classic metal bands and musicians, such as Black Sabbath, Ozzy Osbourne, Dio, and Deep Purple, continued with various line-ups alongside NWOEHM bands such as Iron Maiden and Judas Priest. Those who had their roots in the classic era often maintained relatively complex song forms. For instance, much of Dio's classic material such as "Holy Diver" (*Holy Diver* 1983) does not have a refrain;

6. Similar development has been going on in Finland; many of today's important heavy metal musicians (e.g. of HIM and Stratovarius) have studied in, for example, Helsinki Pop & Jazz Conservatory.

in some ways it much resembles classical *rondo* form, which is a characteristic feature of many other classic heavy metal compositions such as Black Sabbath's "Neon Knights" (*Heaven and Hell* 1980).

However, two other major subgenres may be differentiated from the traditional strain. Largely because of its emphasis on extravagant visual elements, MTV was especially important for "lite metal" (the term adopted from Weinstein 2000: 45–48). Lite metal includes softer styles of metal with genre labels such as "glam metal", "hair metal" and "pop metal" – basically all "sweetened" metal with the "real heavy stuff removed" (Weinstein 2000: 47). Lite metal bands often associated themselves with "hard rock", a term which suggests a less transgressive relationship to heavy metal (ibid.). By the mid 1980s, lite metal bands such as Bon Jovi, Mötley Crüe, Twisted Sister, and Poison had transformed the heavy metal audience; it was now more female, and, in addition, included many who did not especially count themselves as metal fans (e.g. Walser 1993: 13). According to Weinstein (2000: 46–47) lite metal is mostly known for "power ballads". Actually, power ballads are often quite similar to pop songs, only that they are played with heavy metal sounds. Power ballads link lite metal to the American strain of post-psychedelic rock music – country rock.

On the other hand, a counter pole emerged. This "fundamentalist strain" (Weinstein 2000: 48) of metal may be called "extreme metal" after Keith Kahn-Harris (2007). The first extreme metal style in the early 1980s was "speed", or, "thrash" metal. Speed/thrash started as an underground movement, a counter-attack towards the "false metal" of lite metal bands. The most important groups of this time include Metallica, Megadeth, Anthrax, and Slayer (cf. Walser 1993: 14). If lite metal was pop-oriented and sweet, speed/thrash was vicious and aggressive. It was much more riff oriented and thus more directly linked to the new wave of European heavy metal than lite metal. Furthermore, speed/thrash metal took aggressive rhythmic influences from hardcore strains of punk (cf. e.g. Weinstein 2000: 49; Walser 1993: 14). Although every band had their individual style, the speed/thrash movement in general did not lose earlier heavy metal's ideals of control and virtuosity. For instance, Metallica's compositions were often relatively complex, extended in form and heavily based on riffs, much akin to the NWOEHM; one may compare Metallica's *Master of Puppets* (1986) to, for example, Iron Maiden's *Powerslave* (1984).

By the end of 1980s speed/thrash, in turn, was in the mainstream. Quite soon the extreme strain of metal spawned other even more extreme styles, major strains being "death" and "black" metal. These subgenres started to develop in the early 1980s and derived much of their music and ideology from early speed/thrash metal and hardcore punk (see e.g. Mudrian 2004); they usually claimed to be heavier and heavier metal than anyone before. In the early 1980s

black and death were more or less musically indistinguishable, mostly differentiated by extra-musical factors. Black metal artist often use "corpse paint" and theatrical costumes, whereas death metal artists usually wear their every-day clothes. Theatrical outfit and face-painting much resembles the style of shock rock the 1960s and 1970s shock rock artists such as Arthur Brown and Alice Cooper; the style was later adopted by KISS in the 1970s and King Diamond of Mercyful Fate in the early 1980s. This may also be seen as a link to post-punk gothic rock, alongside the frequent use of keyboards. Furthermore, their interest in the imagery of horror led many black metal artists to use pseudonyms such as Cronos, Quorthon, and Euronymous, whereas death metal musicians usually use their given names. On the musical side, black metal bands may include keyboards. Besides the outfits and gloomy appearances this links black metal to post-punk gothic rock (e.g. Christe 2004: 272). A distinction between black and death metal can also be made on the basis of their lyrical themes. It seems that from the early stages black metal lyrics have mostly dealt with anti-Christian religious themes, whereas death metal lyrics deal with death and morbid images. For instance, a quote from Johan Edlund of a black metal band Tiamat reflects this.

> For me, black metal had a lot to do with the lyrics and the image of the band more than the sound […] That's why I'd consider early bands, like early Venom and Mercyful Fate, black metal. But I remember we were always arguing over this with the Nihilist [later Entombed] guys […] they would never sing about Satan, for example, where we didn't want to sing about gore and zombies, so I guess that was the difference. (Mudrian 2004: 105.)

While Mercyful Fate and Venom strongly held on to themes of the occult in their lyrics, their music was still based on the NWOEHM, which lacked many characteristics of extreme metal. Mercyful Fate includes falsetto vocals much in the style of, say, Judas Priest, whereas Venom relies on a low-range grunting vocal style heard in Motörhead. Mercyful Fate's *Don't Breake the Oath* (1984) and Venom's *Black Metal* (1982) serve as examples. A shouting vocal style that largely ignores melody became essential to the majority of black and death metal. Due to this, lyrics are often hard to comprehend without reading them from album covers.

Amongst the first, British Napalm Death, American Death, Swiss Hellhammer and Swedish Bathory set standards for musical characteristics of extreme metal. Very fast tempos are used throughout the genre and the songs are often much shorter than in traditional metal, which is another link to hardcore punk. For instance, Napalm Death's album *Scum* (1987) includes 28 tracks, with an average length of approximately one minute. The album included a hit single "You Suffer" that was just over one second long. In Bathory's *Bathory*

(1984) the approximate song length is three minutes. However, American death metal bands such as Death in the album *Leprosy* (1988) frequently applied lengthy songs that were much more in the spirit of NWOEHM. In general, extremely fast tempos set new technical standards for instrumental techniques. Drummers developed "blast beat" (see Kahn-Harris 2007: 32–33) and guitar riffs often include such fast notes pitches are often rather difficult to separate from one another. Rather interestingly, the kind of extremely fast guitar picking displayed in, for example, Bathory's "Armageddon" (*Bathory* 1984), makes the guitar sound like a tremolo effect and not anymore separately articulated individual notes. These characteristics were taken further by the 1990s Norwegian black metal bands such as Darkthrone in, for example, *Under a Funeral Moon* (1993).

Following the fragmentation in the 1980s, heavy metal as a genre started to "decay", as happens to any musical genre. Ronald Byrnside's (1975: 161) arguments about the formation of a musical style illuminate this: "having been represented in a substantial body of compositions over a certain amount of time, the style becomes so familiar that both composer and audience begin to lose interest". This happened as other styles, such as rap and techno, took over the development of new ideas. In the 1990s, heavy metal was essentially subsumed into the popular mainstream.

> In the 1990s, Metallica, Van Halen, Ozzy Osbourne and other veteran performers continued their success, but the term heavy metal was less often used to distinguish them from the rock mainstream. New groups such as Soundgarden, Korn and Rob Zombie continued the heavy metal tradition in some ways, but were not particularly concerned with claiming the genre label, which had lost much of its prestige. (Walser 2004a.)

However, recently heavy metal bands that were popular in the eighties and before have revived their popularity and re-established the "classic" form of heavy metal. This can be seen in the substantial touring often conducted on the massive scale of the 1980s by, for example, Iron Maiden, Ozzy Osbourne, Deep Purple, Judas Priest and Black Sabbath. Furthermore, during the writing of this thesis, a number of classic groups have visited Finland several times, for example, Motörhead, Judas Priest, Iron Maiden, Dio, Accept, WASP, and Black Sabbath in both the classic 1970s line-up and the ever-popular early 1980s line-up with Dio newly renamed as Heaven & Hell. A reason for this regained popularity might be that early heavy metal fans, now in their thirties, forties and fifties, have enough money and nostalgia to support their favourite bands. In conclusion, in the first decade of the 21st century, heavy metal is again in the popular mainstream. Veteran metal musicians have gained such an iconic status the reality TV shows such as *The Osbournes* have been made

possible. In Finland there have recently been some peculiar metal-related moments: a heavy metal vocalist won the Finnish Idols competition; a heavy metal band Lordi was triumphant in the Eurovision song contest, and subsequently posed with the prime minister, who allegedly attends heavy metal concerts from time to time. In this light heavy metal can hardly be called rebellious. Recent developments work strongly against the notions that heavy metal is musically diminutive, fundamentally rebellious, and only for teenagers – views that are still frequently promoted (e.g. Stuessy & Lipscomb 2006: 362). Today, in a Black Sabbath or Iron Maiden concert it is likely that one will see heavy metal fans from three generations. A typical heavy metal listener has also been described as adolescent, poorly educated heavy drug user (see discussion on the matter in, e.g. Weinstein 2000: 106–111 and Christe 2004: 294–295). The heavy metal audience today is not simply uneducated nor low-class. A recent survey conducted by Stuart Cadwallader and Jim Campbell has shown that, amongst especially gifted students, heavy metal is one of the most popular styles of music, whereas jazz and classical music are the least popular (Fleming 2007). Clearly, there has been a major change in the recent decades.

3

Concepts and Theories of Harmony

> [H]armony is nothing other than diversity of moving parts and consonances, brought together with variety (Gioseffo Zarlino [1517–1590] 1968: 52).

In general, the way harmony is perceived is a combination of 1) characteristics of physical sound, and 2) conventional ways of interpreting what we hear as established by music theory, education and practise. This chapter presents some basic concepts of harmonic analysis that are applied throughout the study. First, however, there is an introduction to the basic terminology – the most important being the concepts of *chord*, *interval*, and *harmony*. These concepts might seem self-evident, because of strong conventions held in their present usage. However, the way they appear in heavy metal differs from their common-practise usage to various degrees, thus it is necessary to explain how these concepts are understood and used in this study. For instance, despite their frequent appearance in studies and textbooks on harmony, terms such as "chord", "triad" and "harmony" are often used in less than specific ways, and in the vernacular they are often synonymous. While this so-called traditional harmony derives mainly from the classic era of Western art music (ca. from the mid 17th to the late 19th century), heavy metal harmony also exploits other ways of construction as suggested in this study. Thus it is necessary to explore the various ways that these concepts are understood in other Western traditions, too, in order to consider how they can be used as clearly as possible in the context of heavy metal.

3.1. Chord, Interval, and Vertical Harmony

The terms and concepts of chord and harmony interlock in various ways. Their relationship is presented by Arnold Schoenberg (1978: 13) in the following man-

ner: "Harmony [is] the study of simultaneous sounds (chords) and how they may be joined with respect to their architectonic, melodic, and rhythmic values and their significance, their weight relative to one another." Combining chords and intervals in order to form harmony can occur in both the vertical and the horizontal (or linear) dimension, but this chapter deals mainly with the former. In a strict sense the vertical dimension of harmony deals with chords and intervals as simultaneously sounding individual structures without considering their tonal surroundings. When these structures are combined with each other in musical time, and thus put into a tonal context, it is the linear aspect of harmony that is of interest. However, as simultaneously sounding vertical structures are the building blocks of linear harmony, it is first necessary to explore this vertical dimension. In *Continuum Encyclopedia of Popular Music of the World* (Shepherd et al. 2003) Philip Tagg argues the following:

> A chord is the simultaneous sounding, by any polyphonic instrument or any combination of instrument(s) and/or voice(s), of two or more notes of different pitch. The simultaneous sounding of notes of the same name – that is, pitches separated by octave intervals – is not considered to be a chord. Derived from the Greek *chordē*, via the Latin *chorda* (meaning the string of a musical instrument), the term 'chord' came to denote, in sixteenth-century Europe, the sounding together of different notes played on several instruments of the same family, especially the strings. (Tagg 2003a: 521.)

The term "chord" has had different interpretations in the course of history of Western music theory. Walter Piston and Mark DeVoto present a view that is the most prevailing in common-practise usage of the majority of textbooks on harmony:

> The combination of two or more harmonic[7] intervals makes a *chord*. The simplest chord is the *triad*, a chord of three tones obtained by superposition of two thirds. The triad may be said to be the basis of our harmonic system, a place [that it] still holds despite numerous radical developments in tonal music. (Piston & DeVoto 1978: 12.)

The writings of Jean-Philippe Rameau (1683–1764) are without doubt the most influential in establishing the status of the triad as the basis of our harmonic system. For Rameau the root position triad was "the perfect chord" from which every other "harmony" was generated (see e.g. Rameau 1971: xl, xlix, 16, 40). "[T]here are only three primary consonances, the fifth and the two thirds; from these is constructed a chord called *natural* or *perfect*" (Rameau 1971: 16). Furthermore,

7. The authors do not in any way give an explanation on their conception of the term "harmonic", which leaves the reader in doubt with their meaning.

> Crucial to any theory of harmonic tonality is the notion that the basic harmonic unit is the chord, not the interval – that harmonic intervals are best understood as the components of chords, not that chords merely arise from combination of intervals. (Lester 2002: 754.)

Most of Rameau's ideas that were revolutionary at the time were published in *Traité de l'harmonie* in 1722. Rameau strongly emphasizes the triad as the basis of harmonic theory, whereas earlier systems were based on intervals and their relations. For instance, Gioseffo Zarlino (1517–1590), a Renaissance theorist, says nothing of chords, not to mention triads, but speaks rather of intervals and their harmonious combination (see Webster 2004; Zarlino 1968). In the early eighteenth century, chords and triads inevitably replaced intervals as the principal source material of harmony in common-practise usage and thus they became the foundation musical theorizing for the following three hundred years. "Rameau's harmonic system, established with genius but full of inconsistencies, became the point of departure and set the course of harmonic theory for his successors" (Mickelsen 1977: 8).

The fact that music theorists often use the terms "chord", "triad" and "harmony" as synonyms makes it difficult to trace the origins of these terms. For instance, who was the first to use the term "chord" in its modern sense? It certainly was not Zarlino in the sixteenth century, although he undoubtedly had a major influence on the concept, for which he is frequently and rightfully accredited. To my present knowledge, the earliest definitive use of the term is in Rameau's *Traité* in 1722. Fux does not use the term "chord" at all in *Gradus* (1725) but mentions "triads". Furthermore, Fux's "triad" (or "harmonic triad") only denotes what would these days be called "a root position triad", not any of its inversions (see Fux 1971: 71–72). This seems to obscure things further and to create confusion even for modern writers. Inversions were in fact yet another of Rameau's innovations (this will be further discussed in Chapter 4.4.2). Anyway, as a term "triad" seems to precede "chord" by approximately one hundred years (see e.g. Bent 2002: 569).

Simultaneously sounding constructions that nowadays would be called "triadic" or "tertial" were preferred from the sixteenth century on:, during which time musical, and especially harmonic thought was shifting in favour of vertical harmonic units as musical building blocks (those that we nowadays call "chords"). As noted earlier, Tagg (2003a: 521) suggests that *in* the sixteenth-century the term "chord" came to denote the sounding together of different notes. In the light of other literature cited here, Tagg's argument seems like a simplification of history of music theory. The concept was developing from the sixteenth century, but the term was not used explicitly until Rameau in the early eighteenth century. Zarlino might be credited for the *concept* (as

in Mickelsen 1977: 6), but he still relied on *intervals* that should form "perfect *harmony*" in contrapuntal relations, not on "chords" or "triads" (cf. Lester 2002: 754). According to Joel Lester (2002: 754–755) it was "[o]ther late sixteenth-century theorists [who] came to recognize […] the primacy of chords over intervals". However, without consulting his primary sources it remains unresolved if those theorists actually used the specific term "chord". In any case the practise of thinking of "chords" as basic harmonic units, or "chunks", developed well before Rameau, and most strongly from the instrumental practise of Baroque *thorough bass* playing of *continuo*.

> […] keyboardists inevitably came aware that the same right-hand chord could be played over differing signatures. For instance, C-E-G could be played in the right hand over an unfigured bass C, as well as over an E figured with 6/3 and a G figured with 6/4. (Lester 2002: 755.)

This practical approach was in contrast with theoretical concepts such as Zarlino's and later Fux's, and had a great deal of influence on Rameau's theories.

Another characteristic of the "chord" according to Piston & DeVoto is that they are constructed by the superposition of thirds. This was also noted by Rameau (1971: 39): "[t]o form a perfect chord, we must add one third to the other; to form all dissonant chords, we must add three or four thirds to one another". Tagg (2003a: 522–523) calls chords structured in this manner *tertial*. Despite the continuing supremacy of triadic forms, many developments in music during the twentieth century – whether it was art, jazz or popular – have led theorists to seek definitions for the term "chord" that are not solely tied to triads. Tagg (2003a: 522) suggests that "[o]wing to the global predominance of Western harmonic practises, it is useful to distinguish between two main categories of chords: tertial and non-tertial". Chords used in heavy metal fall frequently into both of these. Here one may return to such definitions as Tagg's; he suggests that a "chord" is formed with at least *two* different notes whereas the standard definition calls for at least *three*. For this study Tagg's definition is more useful than the traditional one since structures other than tertial ones are very common in heavy metal. However, even if this definition of "chord" is not based on triads, they remain the basis for almost all systems of harmonic analysis; due to the practices of Western tonal music the term "chord" is still associated with the triad in common-practice usage. Furthermore, triads and other tertial chords have a special place in the standard nomenclature in that common chord symbols and analytic symbols of various kinds are based on them (see e.g. Tagg 2003a: 522–523). For instance, how should a chord that is constructed only of, say, notes *a* and *f* be named? There is no special symbol or

name for it other than "an interval of a minor sixth".

The relationships between "harmony", "chord", "interval", and "tone" may be presented in a form of a triangle (Figure 3.1), in which these concepts relate to one another hierarchically in interlocking and interdependent, but distinct categories. Introduced with short explanations – starting from the lowest hierarchic unit – the categories are 1) "tone", referring to a complex of sounds that is usually perceived as a single pitch and notated with a single note (cf. Piston & DeVoto 1987: 4fn); 2) "interval", referring to the distance between any two tones; 3) "chord", denoting a simultaneous sounding of two or more notes produced with one or more instruments; 4) "harmony", referring to the overall "sounding together" (*Zusammenklang*; e.g. Mooney 2006) of simultaneous tones, chords or intervals, including their combinations in a tonal context and progressions in linear dimension.

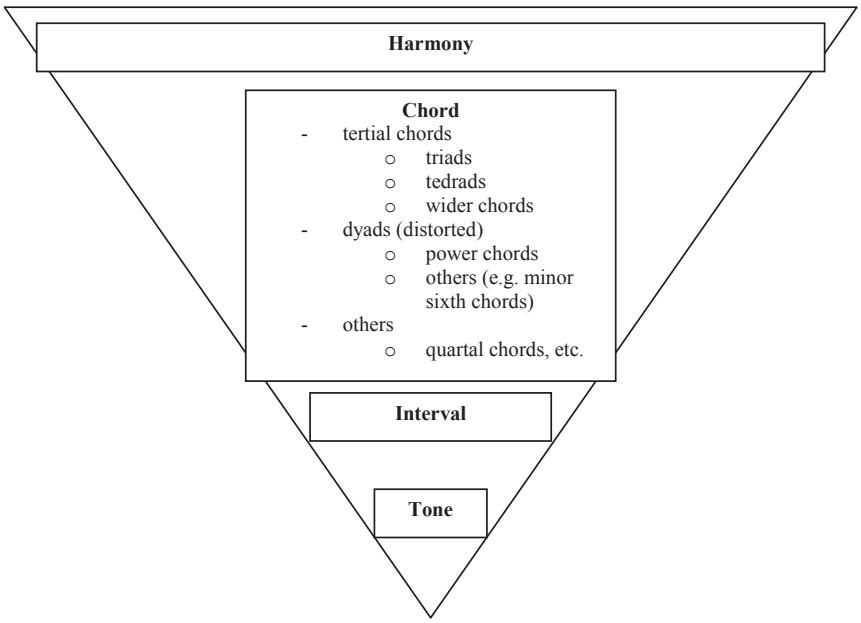
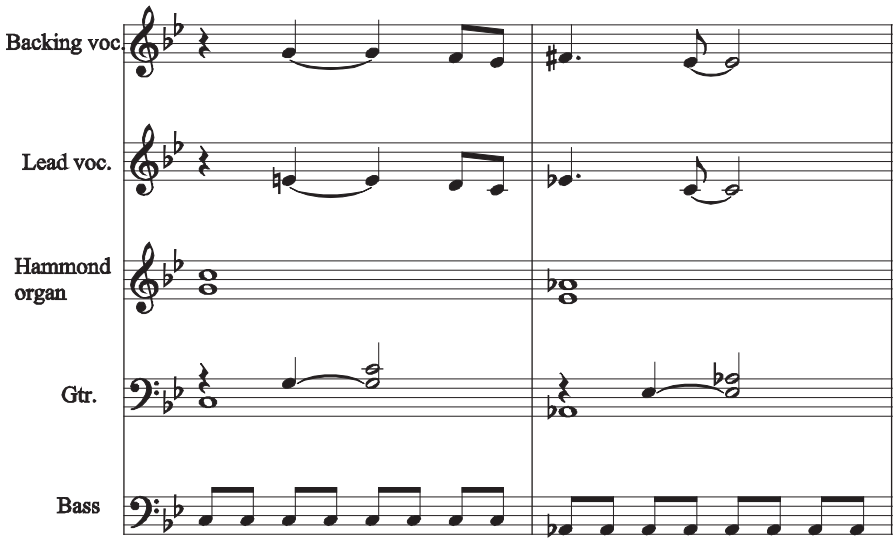


Figure 3.1. Construction of vertical harmony.

Defined according to Schoenberg's theories (1978: 13), "chords" are the building blocks of "harmony". "In most types of popular music, chords are generally regarded as belonging to the accompaniment part of [the] melody/accompaniment dualism" (Tagg 2003a: 521–522). In general music theory "chord" has a two-fold meaning. Firstly, it can denote a structure played by a single instrument, a definition linked to instrumental practises. Secondly, it can denote a sounding vertical structure, in which all the notes sound at the same point in

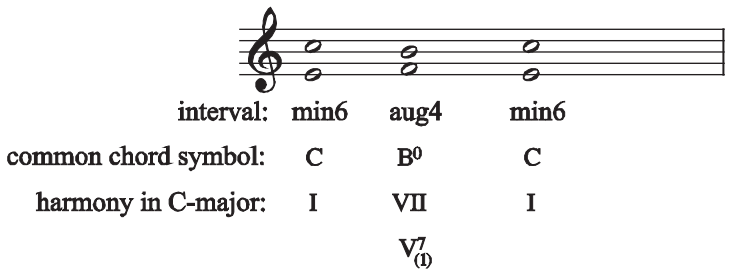
time regardless of the instruments involved. These two types of "chords" may be discussed in relation to the excerpt in Example 3.1. The one-instrument level is presented by the guitar's arpeggiated three-note power chords and organ's two-note power chords (both form a C-chord and an A-flat chord in the first and the second bar, respectively). The overall vertical chords are formed by these two combined and, furthermore, added to the harmonized vocal part and the bass part. For instance, the first bar they form a chord that could be described as a C major triad, whereas the second bar chord could be called an A-flat-seventh or a "German augmented sixth", depending on the analytical tradition and system in use.



*Example 3.1. An excerpt of Deep Purple's "Smoke on the Water" (*Machine Head *1972), chorus section.*

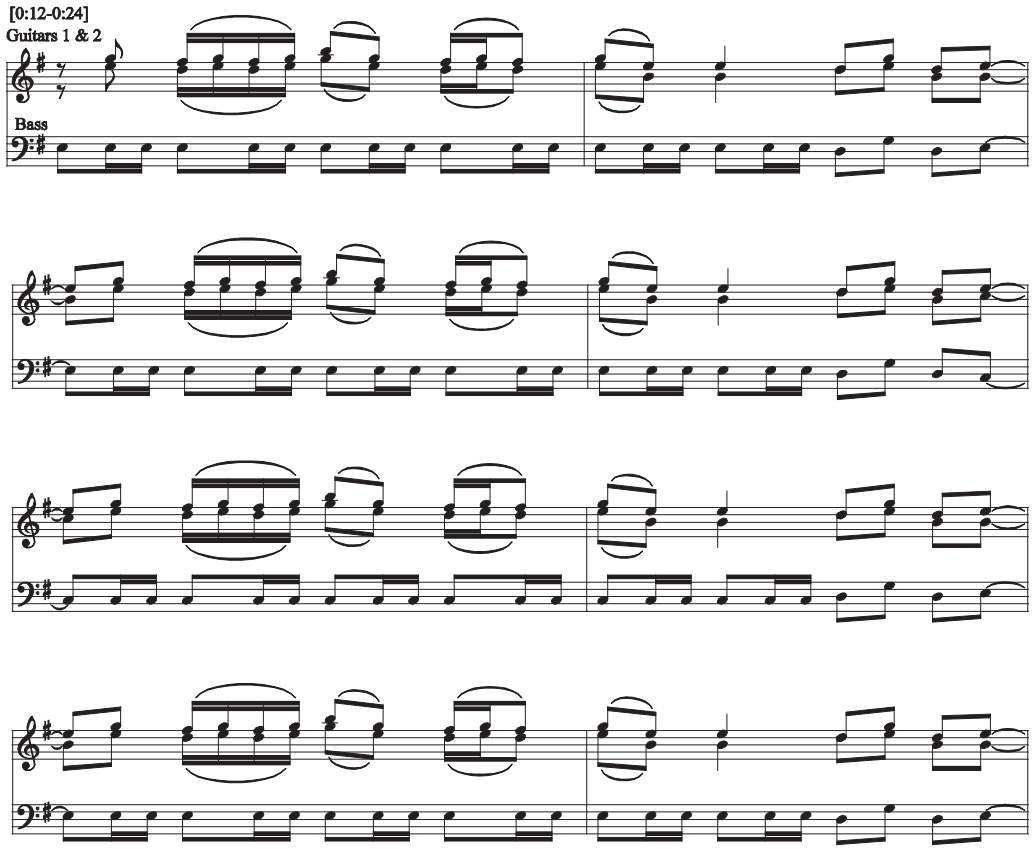
A chord as such, is formed by combining single tones or intervals. As a concept, it is an isolated unit, or a "chunk", with no contextual relations needed; the same goes for intervals and, furthermore, for tones. Following common-practice terminology Piston & DeVoto (1978: 12) link the concept of "chord" with that of "interval" in a way that makes the latter a lower level category in the hierarchy. In common-practise theory a "chord" is formed by superposing two intervals, namely thirds; intervals are not usually understood as "chords" in their own right (some common exceptions to the rule are much dependant on tonal context; see e.g. Salmenhaara 1968: 60). This approach is not entirely practical in a study of heavy metal; it raises analytical problems, because the style of music is not entirely based on triads, but frequently on other structures,

especially dyads. For instance, the most normative structure played on heavy metal guitar – the so-called power chord – consists of an interval of the fifth or the fourth. Among other writers on common-practice harmony, Erkki Salmenhaara (1968: 60) calls these chords "open", since they include no third. This line of thinking is largely based on four-part chorale style of writing. Indeed, the simplicity of the power chord structure is only apparent; with guitar distortion the resultant sound is far more complex (see Chapter 4), and it would be misleading to not to call them "chords". Even in common-practise theory a single interval may represent a chord. In Example 3.2 the intervals of a minor 6th and an augmented 4th may be seen as representatives of C major and B-diminished chords respectively. Furthermore, in the context of C major, they represent harmonic degrees I and VII (or V7 with omitted root; cf. Salmenhaara 1968: 61). In other words, an interval may be regarded as a chord, and a chord may represent harmony within a tonal context.

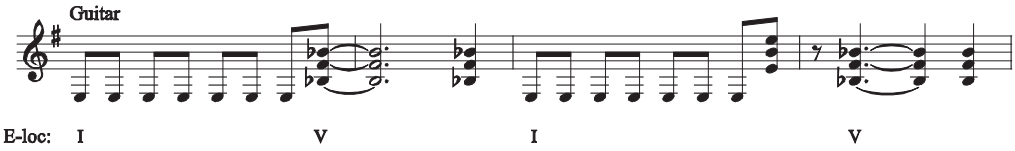


Example 3.2. Common intervals representing chords and harmony.

The double guitar riff in Iron Maiden's "Trooper" (*Piece of Mind* 1983) further exemplifies the capacity of an interval to express harmony (Example 3.3). The section is built on an *ostinato* riff on two guitars, which relies on E-Aeolian scale degrees; although embellished, the riff is based on thirds and fourths to represent the I degree chord (and VI in bar 5). Furthermore, a single tone may have a significant role in defining a chord. As in Baroque, the most likely part to act in this function is the bass. Although the guitar ostinato plays a significant role in forming the tonal and modal context, it is the bass that ultimately decides the chord in question; and furthermore, defines the harmonic progression. Thus, mm. 1–4 and 7–8 appear to be built on E minor and mm. 6–7 on C major; these in turn may be interpreted as harmonies on E-Aeolian degrees I and VI respectively. In some cases, such as in Example 3.4, a single tone may act as the sole representative of a chord. Here, the guitar's low E in mm. 1 and 3 serves as an E-chord. Furthermore, given the tonal/modal context, it creates an impression of an E-Locrian tonic harmony.



*Example 3.3. The main riff to Iron Maiden's "The Trooper" (*Piece of Mind *1983).*



*Example 3.4. Riff to Black Sabbath's "Symptom of the Universe" (*Sabotage *1975) [0:00–0:06].*

Harmony – the highest category in hierarchy – is formed by the vertical combination of single tones, intervals, chords, or all of the mentioned. Harmony denotes the horizontal-vertical combination of the aforementioned elements in succession as well as simultaneously. Thus, harmony entails a combination of chords, intervals and tones and also their contextual relationships. This line of thinking forms a basis for most theories of harmony, including scale-degree

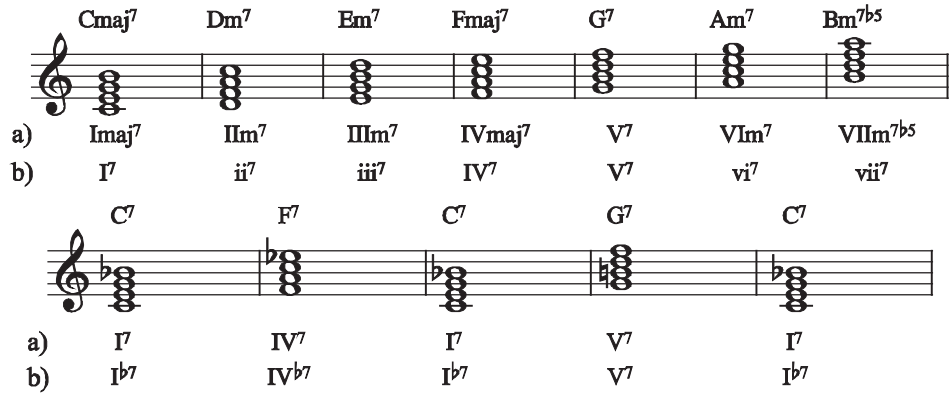
systems (see Chapter 3.2), chord-classification systems (Chapter 4.6), harmonic function (Chapter 3.4) and linear harmony (Chapter 3.5 and Chapter 6).

3.2. Scale Degree Systems

The most common method of vertical harmonic analysis is to use various kinds of chord symbols to denote chords as located on degrees of the scale within a given key. The first one to popularize and also claim authority for this kind of symbol system based on scale steps (or *Stufen*) was the German theorist and composer Gottfried Weber (1779–1839) (Weber: 1851: 286–288; Riemann 1977: 210; Hyer 2002: 734–735; Bernstein 2002: 782–788). This notation system achieved "widespread popularity in the second half of the nineteenth century" (Bernstein 2002: 787).

> [Weber] refined Georg Vogler's step theory (*Stufentheorie*), which used Roman numerals to associate chord function with scale degree. While Vogler used only upper-case numerals, Weber's system indicated quality as well. He used upper-case numerals for major, lower-case for minor, and a superscript circle for diminished quality. To identify a key, he used upper- or lower-case letters followed by a colon (for example, g: i iv V i), a system still in use. (Saslaw 2004.)

In modern scale-degree systems non-diatonic chord roots are indicated by an accidental preceding the Roman numeral (e.g. ♭III for the E♭ major chord in the key of C major). A system that was originally developed for the analysis of classical music has been adapted to the harmonic analysis of most popular music. The classical system of scale degrees works very well if the music abides by the rules of classical harmony. However, popular music often does not. This has led to many variations on the basic concept. For example, "in a popular system presented in *Down Beat* [magazine], roman numerals are simply substituted for the letter names in chord-symbol notation" (Strunk 2006). Example 3.5a shows how this type of notation denotes diatonic seventh chords in C major and a common blues progression, and Example 3.5b shows a more classical notation.



Example 3.5. Common tetrads and blues chords (after Strunk 2006).

Classical chord notation is very practical when chords are diatonic (i.e. fall within a single key as in the previous C major example). However, in the case of the blues progression its usefulness is called into question. In the blues progression the same chord structure (i.e. the dominant seventh) appears on all scale degrees. The classical analytical notation suggests that C7 and F7 are altered chords, which is misleading; although they are altered in relation to C major, the dominant seventh is often the default chord on all scale degrees in the context of the blues. In cases like this, classical notation may have implications that are not relevant to the music in question, and thus lead to misinterpretations.

Another variation common to popular music analysis is to substitute Roman numerals for the pitch classes. The scale degrees in the key of C (whether in major or minor) are substituted for the pitch class names as follows: I for C, ♯I/♭II for C♯/D♭, II for D, ♯II/♭III for D♯/E♭, etc. (see e.g. Lilja 2002: 23–24); the logic of the system works this way, although more commonly only the flat scale degrees are needed for the analysis of popular music (cf. Tagg 2003b: 540). Furthermore, in this system Roman numerals usually designate the place of chord fundamental in relation to the major scale of the tonic degree. For example, if C was the tonic pitch class, an A♭ major triad would always be ♭VI degree chord regardless of the modality of the key (i.e. regardless whether the key was a major or minor). Thus, there would be no need to differentiate between the chords of a major and minor key. This system is thus more flexible than classical notation – especially when there are plenty of chords that are not within a single key (as in much jazz and rock music).

In any case, the choice of a method ultimately depends on the goal of analysis. Often it is inappropriate to treat common chordal vocabulary of a musical style as exceptions or deviations from "normal" harmony. This is the

main reason for developing and revising classic chord notation systems. For example, Allan F. Moore (1992; 1995; 2001: 53–55) has suggested using the modal system for the analysis of rock music. In this system the chord degrees relate to a modal scale, not to the traditional major or minor scales. In this study the terms "mode" and "modal" are used to designate scale types and not "melodic motifs" or "patterns" as sometimes is the case (see e.g. Powers & Cowdery 2004). The names for the modes are originally derived from the theories of the Ancient Greeks for the use of Gregorian plainchant and Renaissance polyphony. These scale types are mostly introduced in the 16th century by such theorists as Heinrich Glarean (1488–1563) and Gioseffo Zarlino (1517–1590) (e.g. Powers & Wiering 2004b). Modes refer to seven note scales (and here, to their equal-tempered equivalents), where tones (t) and semitones (s) are distributed as follows.

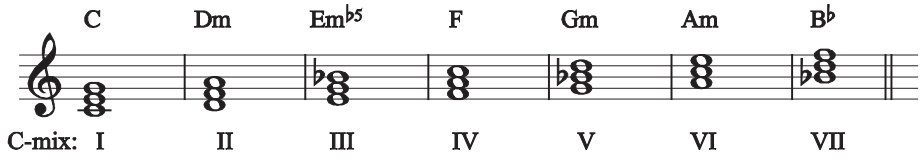
Lydian:	t – t – t – s – t – t – s,
Ionian:	t – t – s – t – t – t – s,
Mixolydian:	t – t – s – t – t – s – t,
Dorian:	t – s – t – t – t – s – t,
Aeolian:	t – s – t – t – s – t – t,
Phrygian:	s – t – t – t – s – t – t
Locrian:	s – t – t – s – t – t – t

(after Moore 2001: 54).

The first six modes were used in the medieval and Renaissance eras, and their names also originate from those times. The Locrian mode was also included by the Renaissance theorists; then the mode was usually called "Hyperaeolian" (see Powers 2003a, 2003b; cf. e.g. Zarlino 1968: 26). At that time it was excluded in musical practise because of the diminished fifth between its root and the fifth (see e.g. Zarlino 1968: 29). However, the mode has become common compositional material in the 20th century (see Persichetti 1961: 32, 175; Honti 2006: 47; Slonimsky 1947: 137). In heavy metal music, "the alternation between E in the bass and the B♭ power chord seems unusually common in thrash metal. In Renaissance and Baroque music, this relationship connoted the works of the devil […]" (Moore 2001: 179n21). This interval (the "devil in music") has been common since the advent of speed/thrash metal in the 1980s (e.g. Metallica's *…And Justice for All*, 1988), but was already used in the early 1970's, especially by Black Sabbath (cf. almost any song in *Black Sabbath*, and *Paranoid*, both 1970).

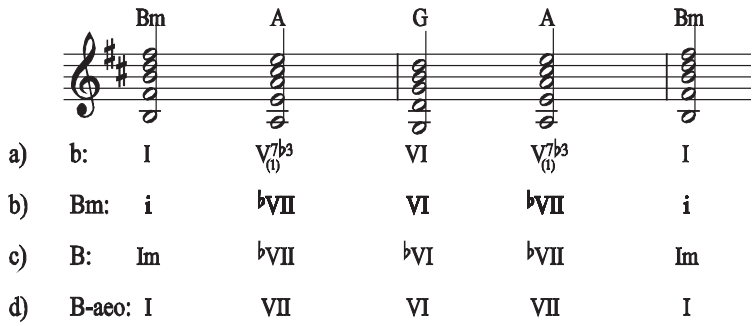
A significant difference between modern and earlier usage of modes is that in modern times the modes can be transposed to any tone. In medieval practise

modes were usually tied to certain notes (e.g. Aeolian is an A-mode, Phrygian is an E-mode etc.; see e.g. Jeppesen 1975). In modern modal systems (e.g. Moore 1992; 1995; 2001: 53–55, Persichetti 1961: 31–36) chords are built on the modal scale-steps, just as with traditional chord construction. Example 3.6 shows the chords constructed on C-Mixolydian scale-steps. In addition, the way of denoting the "key" at the beginning of the analysis is introduced here (e.g. "C-mix" means that following chords are analyzed in C-Mixolydian mode).



Example 3.6. Triads of C-Mixolydian mode.

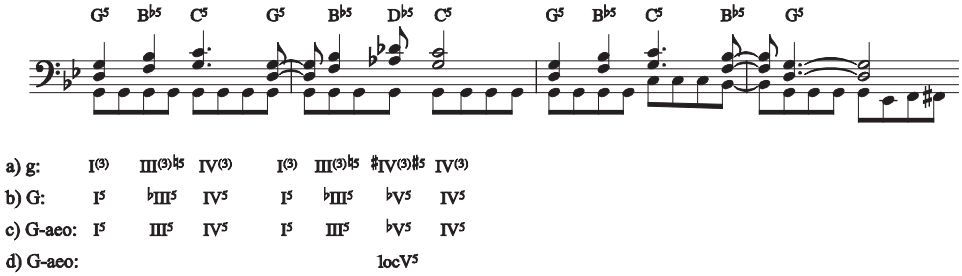
The basic advantage of the modal system is that it makes harmonic analysis simpler and diminishes the need for chromatic symbols for "root altered" harmonies. This is especially important if one does not want to treat chord degrees that differ from those of the traditional major/minor tonal system as some sort of deviation (this has been discussed in length in Moore 1992). Using an analytical method that has the major/minor tonal music as its starting point can lead us to see the major/minor tonal features as "normal" or "natural", and anything that differs from those features as "deviant" (see e.g. Everett's [2000] Schenkerian analyses of rock music). For instance, in much rock music the Mixolydian (i.e. "flattened") seventh degree is far more prevalent than the Ionian (i.e. major) seventh degree (Moore 1995). The analytic labelling according to a mode makes the analysis simpler in many cases. For example, if one analyzes the popular Aeolian chord progression VI-VII-I according to the principles of traditional harmonic analysis, the results look quite strange and hardly do justice to the music; Example 3.7 shows Jimi Hendrix's "All Along the Watchtower" analyzed with four different notations.



Example 3.7. Chord progression from Jimi Hendrix's "All Along the Watchtower" analyzed in four types of notation: a) classical notation, b) its common variation showing chord quality, c) combination of absolute chord symbols and scale-degree system, and d) modal system.

Whatever the choice of notation, one should be careful as to what the chosen method implies about the music. For instance, the classical system (Examples 3.7a and 3.7b) is based on the harmonic minor (cf. Salmenhaara 1968: 61; Piston 1962: 33).[8] Furthermore, some would regard the A major chord as an altered chord, thus the additional figures and chromatic markings used by Erkki Salmenhaara (1968: 61). By comparison, Walter Piston (1962: 174) does not differentiate between modal variants of VII. Anyway, in rock music the modal-based chord notation is usually the simplest – if the progression is analyzed in Aeolian mode (as in Example 3.7d), there are no altered chords. In the light of this example it is evident that the modal system makes the analysis more concise. While Moore's theory is sound it could have been taken further. In practice heavy metal chords do not follow one single mode, and thus, one still has to use additional symbols to designate the structure correctly. For instance, Moore (2001: 55) presents Jimi Hendrix's "Hey Joe" as an Aeolian VI-III-VII-IV$^{\sharp 3}$-I$^{\sharp 3}$, where the major thirds of IV and I (that do not abide by the Aeolian mode) are notated as altered chords. This kind of notation does not take into an account one important feature of rock: vertical acoustic structure of a chord is often more important than whether the chord constituents abide by a certain mode. This is even more so when there is heavy distortion present (this will be discussed in detail in Chapter 4). Any chord notation is, however, going to be more useful in some contexts and less useful in others. For the purpose of this study the advantages of the modal system outweigh its problems. Example 3.8 clarifies some differences between common chord notation and an elaborated modal system.

8. Following the Germanic tradition, Salmenhaara's original notation for the key of B minor is, of course, "h" instead of "b".



Example 3.8. Riff to Deep Purple: "Smoke on the Water" (1972); guitar and bass parts.

The chord sequence is rather alien to common-practise tonal music. Hence, the strict classic notation in Example 3.8a requires additional symbols. First of all, classic notation is based on triadic formations, and thus the "missing" thirds have to be acknowledged with parentheses. Furthermore, as this model is based on the harmonic minor, the fifths in the III degree chords are "restored" to their natural minor form. The D-flat chord is especially strange according to classical thinking. Example 3.8b is a combination of scale degree and pitch class notation, and Examples 3.8c and 3.8d apply variations of the modal system. In Example 3.8c the D-flat chord is interpreted as a chromatic chord (♭V) whereas in 3.8d it is seen as stemming from the Locrian mode (thus the symbol "locV"). Both of these may be regarded as formally correct; the choice between the two is a matter of analytical emphasis. For instance, if one chooses to highlight heavy metal's connection to blues traditions, the likely analytical choice would be that of Example 3.8c, in which the notation implicates that the chord is derived from the blues tradition via the use of the so-called blues scale (cf. Lilja 2004: 71). In conclusion, whatever notation system is applied, it is important to recognize the assumptions that are inherent to each.

3.3. Consonance and Dissonance

In Western music the distinction between consonant and dissonant sounds has been a strong determining factor in music theory and, furthermore, a major guideline for compositional theory and practice. Already in the sixteenth century Gioseffo Zarlino said that a composition must be composed "primarily of consonances and only incidentally of dissonances" (Zarlino 1968: 53). This view has been apparent in Western music ever since. There have always been "rules" that govern the use of the so-called consonant and dissonant structures. Through the centuries the general distinction has always been there, although boundaries, definitions and justifications have varied over time. Regardless of the classification system, the distinction between consonance and dissonance

plays a significant role in music theory and composition.

"A *consonant interval* sounds stable and complete. A *dissonant interval* sounds unstable, calling for resolution into a consonant interval." (Piston & DeVoto 1987: 15.) Most harmonic theories from the ancient Greeks until today make this division of intervals into those that are "stable" and those that are somewhat "restless". However, the ways intervals are categorised has been ever-changing, as have the grounds for doing so. The common division as it is taught in most harmony classes today (e.g. Salmenhaara 1968: 25–26; Aldwell & Schachter 1989: 27–30) is presented below. As will be discussed later on, this division is relatively recent in the history of music theory.

> The consonant intervals are:
> the perfect unison
> the perfect octave
> the perfect 5th
> the perfect 4th (sometimes)
> major and minor 3rds
> major and minor 6ths.
>
> The dissonant intervals are:
> all 2nds
> all 7ths
> all augmented and diminished intervals
> the perfect 4th (sometimes)
>
> (Aldwell & Schachter 1989: 27)

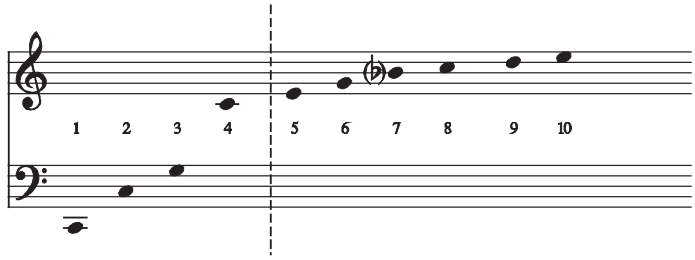
Whatever the system, the criteria for defining consonance and dissonance can be divided in three: 1) acoustic, 2) psychoacoustic, and 3) cultural criterion. They are not mutually exclusive, although their relative emphasis has varied in the course of music history.

> Acoustically [consonance is] the sympathetic vibration of sound waves of different frequencies related as the ratios of small whole numbers […]; psychologically, a harmonious sounding together of two or more notes, that is with an "absence of roughness", "relief of tonal tension" or the like […]. The "roughness" criterion, however, implies a psychoacoustic judgment, whereas the notion of "relief of tonal tension" depends upon a familiarity with the "language" of Western tonal harmony. (Palisca & Moore 2006.)

Acoustic justifications are based on vibration frequencies, although before discovering these, theorists were forced to rely upon vibrating string-length relationships in their discussions.

> The association of consonance with simple ratios goes back at least to the Pythagoreans of the 5th century BCE, who used the term "symphonies" for intervals produced by string lengths in the ratios formed from numbers between 1 and 4. These comprised the octave (2:1), the 5th (3:2), the octave-plus–5th (3:1), the 4th (4:3) and the double octave (4:1). (Palisca 2006.)

In modern terms, the Pythagorean system was based on the relationships of the first four partials of the harmonic series; other partials were excluded from the system (Example 3.9). Intervals and musical scales were constructed as combinations of the four consonances. "Arithmetic operations were used to calculate combinations of intervals: the addition of intervals was computed by multiplication of their ratios, while the subtraction of intervals was computed by their division" (Nolan 2002: 274). For instance, the octave can be obtained by adding the fifth to the fourth (3:2 * 4:3 = 2:1), and the Pythagorean whole tone (9:8) by subtracting the fourth from the fifth (3:2 ÷ 4:3 = 9:8) (Nolan 2002: 274).



Example 3.9. Harmonic series (of C*) divided according to Pythagorean theory (after Tolonen 1969: 10).*

"Explaining musical intervals through ratios and combinations of ratios became the defining feature of the Pythagorean tradition of inquiry in music theory and acoustical science" (Nolan 2002: 274). Pythagorean division prevailed in the following centuries through the middle ages: the prime (or unison), octave, fifth, and fourth were considered to be consonant; all the other intervals were dissonant (Tolonen 1969: 10; also, see Nolan 2002: 273). Producing music by computing simple ratios is, however, an idealised view of music – the practise has always been another matter. The Early Medieval theorists accepted the Pythagorean view since it was not in drastic conflict with the practise of *organum*[9] (Palisca 2006). "Johannes de Garlandia in the 13th century, however, saw that practising musicians recognized different distinctions." (Ibid.)

9. Organum was a practise of harmonizing a pre-existent melody, cantus firmus, mainly with parallel fifths and fourths (e.g. Fuller 2002: 480–482).

> In contrast to prior polyphonic theory, John [Johannes de Garlandia] separates vertical intervals (*consonantia in eodem tempore*) into two categories concords and discords, which he distinguishes […], according to their perceived degree of compatibility. Within each category, he posits a value-laden hierarchy of perfect, imperfect, and medial status. (Fuller 2002: 486.)

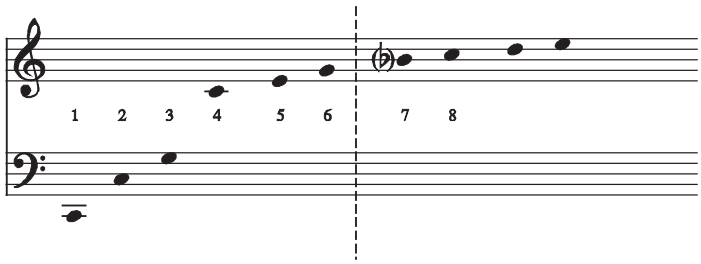
The categories are presented in Table 3.1.

Concords			Discords		
Perfect	Medial	Imperfect	Imperfect	Medial	Perfect
unison, octave	fifth, fourth	major third, minor third	major sixth, minor seventh	whole tone, minor sixth	semitone, tritone, major seventh

Table 3.1. Concord/discord hierarchy of Johannes de Garlandia (after Fuller 2002: 486).

Johannnes's categories were, at least partially, made by on the basis of aural judgement and musical practise. Furthermore, according to Sarah Fuller (2002: 486) "[l]ater theorists do feel free to adjust it, as when Franco of Cologne discards the category of medial discord and consigns the tone to imperfect, the minor sixth to perfect discord status".[10] At the same time, further contradicting Pythagorean theory, in the west of England it was noted that musicians thought the thirds to be the best consonances (Palisca 2006). "The minor 6th was admitted among the consonances in the anonymous 14th-century *Ars contrapunctus secundum Philippum de Vitriaco* […] and both the minor and major 6ths in the anonymous *Ars discantus secundum Johannem de Muris* […], while the 4ths were rejected by them" (ibid.). Despite some efforts in the 14th and 15th century (see e.g. Palisca 2006), it was not until the sixteenth century that thirds and the sixths gained an acceptable theoretical basis for their admission among the ranks of consonant intervals. It was Zarlino who in 1558 in *Le institutioni harmoniche* extended the number of acceptable ratios. In relation to the harmonic series, this meant that the fifth and the sixth harmonic were added to the first four (Example 3.10).

10. Helmholtz (1954: 196) puts Franco somewhat a century earlier in history, gives him the credit of including the thirds among the consonances, and also presents his division rather differently.



Example 3.10. Harmonic series (of C*) divided according to Zarlino's theory (after Tolonen 1969: 13).*

Zarlino's theory classifies ratios composed of the first six partials as consonances (Tolonen 1969: 14). Zarlino's term for this concept was *senario*: "In music, the significance of the *senario* is that all the primary consonances can be expressed as superparticular ratios using only numbers from 1 to 6" (Palisca 1968: xv). Thus, Zarlino was able conveniently to include major and minor thirds (5:4 and 6:5, respectively), and the major sixth (5:3) as consonances (see Zarlino 1968: 16). However, as Claude Palisca (2006) has noted, he was forced to rationalize the minor sixth (8:5) as a composite interval made up of a fourth and a minor third (4:3 * 6:5 = 8:5).

Zarlino's division (Table 3.2) is very near to the common-practice usage nowadays. If compared to Johannes de Garlandia, consonances are here divided only in two: "Practical musicians divide the consonances into what they call perfect and imperfect" (Zarlino 1969: 15). However, Zarlino (1968: 17) reminds that the fourth and the fifth are between the perfect and the imperfect consonances, since "only the octave […] is perfect". This is a clear parallel to Johannes's division in Table 3.1. However, for Zarlino, the dissonances are in a single category, whereas the consonances are in two. Zarlino does not include the diminished fifth or the tritone in his diagrams, but adds that they are dissonances (along with other diminished and augmented intervals), since their ratios are not found among the "harmonic numbers" (Zarlino 1968: 45–48).

Consonances		Dissonances
Perfect	Imperfect	
1, 4, 5, 8	3, 6	2, 7, diminished/ augmented

Table 3.2. Zarlino's division of consonances and dissonances (after Zarlino 1968: 11, 15–16, 45–48). The division applies also to the octave compounds.

Like theorists before and after, Zarlino was struggling to reconcile musical practise and its theoretical justification. "The Number 4 […] was held to be

perfect by the Pythagoreans because from its aliquot and nonaliquot parts, 4, 3, 2, 1, there resulted another number, which they called perfect: the number 10"[11] (Zarlino 1968: 16). In *senario* Zarlino tried to justify the consonant nature of intervals that were already considered by musicians to be consonant.

> The other consonances they [practical musicians] called imperfect, for they ratios are found in numbers beyond 4, namely 6, 5, 4. [… T]hese, according to the Pythagoreans, do not form consonances, and their natures are such that, heard alone in their true ratios, they do not appease the ear so completely that it does not desire a further more gratifying, sweet sound. This is manifest to everyone skilled in music. Rather they must be accompanied by other intervals in such a manner that the extremes of the combinations form perfect concords, or imperfect compound concords. […] Despite this difference, all these consonances may be called perfect when they are determined by their true and natural ratios. (Zarlino 1968: 16.)

In the early 17th century, René Descartes posited "two criteria for distinguishing consonances, simplicity of ratio and pleasingness, the fourth being simpler while the thirds are more pleasing" (Palisca 2006). According to this, it seems evident that Descartes was familiar with Zarlino's *Le Istitutioni*, in which this division was already noted (see Zarlino 1968: 18–20). However, "this separation of the subjective and objective qualities of intervals has characterized modern thought since that time" (Palisca 2006). Jean-Philippe Rameau's *Traité de l'harmonie* reintroduced Zarlino's division and much of its justifications in the early 18th century. Rameau relies on Zarlino's *senario* – leaving out the number seven as creating only displeasing intervals "as is evident to connoisseurs" (Rameau 1971: 6). However, he takes no trouble on justifications of the two sixths since the concept of inversion was central to his theory. Figure 3.2 shows how Rameau demonstrates the order of consonances by presenting seven divided strings.

11. This concept was known as *tetractys* in Pythagorean theory (Nolan 2002: 273).

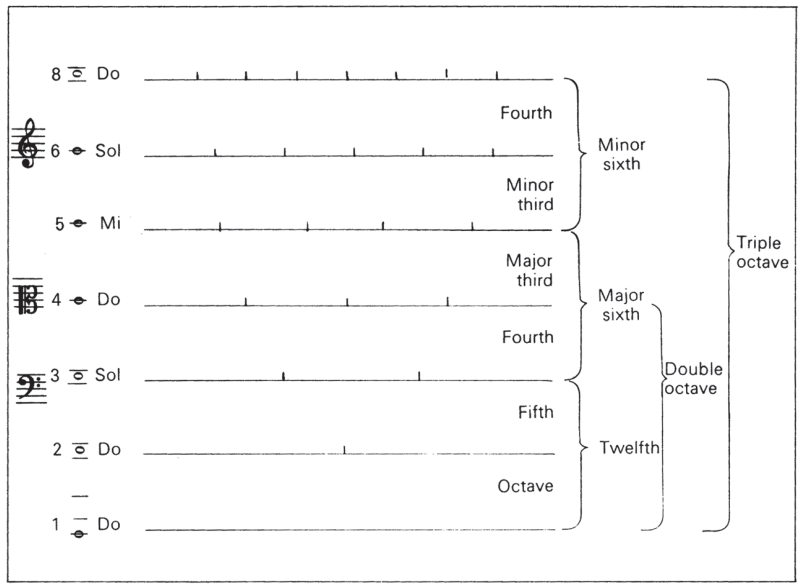


Figure 3.2. Rameau's order of origin and perfection of consonances (Rameau 1971: 7).

> The order of origin and perfection of these consonances is determined by the order of the numbers. Thus, the octave between 1 and 2, which is generated first, is more perfect than the fifth between 2 and 3. Less perfect again is the fourth between 3 and 4, etc., always following the natural progression of the numbers admitting the sixths only last. (Rameau 1971: 6.)

Elsewhere in the treatise the favoured order of the consonances is presented differently. In short, Rameau put the minor third before the major sixth in his theory of chords, although he just had argued differently when discussing the order of intervals.

> […] there are only three primary consonances, the fifth and the two thirds; from these is constructed a chord called *natural* or *perfect*. Three secondary consonances arise from the primary consonances, the fourth and the two sixths; from these are constructed two new chords which are inversions of the first chord. (Rameau 1971: 16.)

At the time of writing the *Traité*, Rameau was not yet familiar with newly discovered acoustical phenomena, the most important being the overtone series. These he included in his later works (see e.g. Gosset 1971: xxi). However, "[t]he derivation of sounds from the overtone series produces essentially the same sounds as the divisions of the string which Rameau proposes in the *Traité*" (ibid.).

Major developments in the field of natural sciences in the 19th century gave rise to new ideas – and problems – for the study of consonance and dissonance. Probably the most influential theorist in the nineteenth century was Hermann von Helmholtz. The concept that consonance was sensory, or an "immediate perceptual impression" (Moore 2003), was one of Helmholtz major arguments. Furthermore, largely due to Helmholtz "[p]sychoacoustic studies have usually emphasized sensory consonance, and tried to explain it in terms of the physical nature of the sounds and the way the sounds are analysed in the peripheral auditory system" (Moore 2003).

> Helmholtz conceived of consonance as a sensory response caused by two factors, the affinity of the upper partials of two or more tones (*Klangverwandtschaft*) and the absence of acoustic beats among these partials. The affinity factor owes much to earlier coincidence theories. The simpler the vibrational ratio of the interval, the greater is the number of coinciding harmonic partials of the component tones. Dissonance, in his view, is caused by a lack of such affinity and by the presence of beats. In technical terms, he conceived of dissonance as a sensation of roughness caused by the interference patterns of the sound waves. (Green & Butler 2002: 260.)

Acoustic beats occur when two sound waves of slightly different frequencies interfere with each other (e.g. Greated 2003a). The number of beats per second is the difference between the two simultaneous tones. For instance, a tone of 440 Hz (cycles per second) will beat four times per second with a tone of 436 Hz (ibid.). The beats will result in a sensation of roughness, and, in the case of certain frequencies, a sensation of one or the other tone of the two being slightly out of tune. For Helmholtz (1954: 170–171, 191) the beating at 33 Hz (produced by a semitone between *b'* and *c"*) was the roughest sounding of the intervals of the musical scale (cf. Green & Butler 2002: 261). However, "[t]he most penetrating roughness arises […] from beats of 30 to 40 in a second" (Helmholtz 1954: 171). According to Green & Butler (2002: 261) "he concluded that […] beating at less than 6 Hz is tolerable and at more than 132 Hz is imperceptible" It must be added that Helmholtz links the perception of beats to different intervals and octave species. "[I]t is not, or at least not solely, the large number of beats which renders them inaudible. The magnitude of the interval is a factor in the result, and consequently we are able with high tones to produce more rapid audible beats than with low tones." (Helmholtz 1954: 171.) Most importantly, he stresses that the sensation of the interval is unaltered in any multiples of beats per second (e.g. 4 * 33 Hz = 132 Hz).

Experimenting with two vibrating violin strings, Helmholtz concluded that beats are less disturbing the simpler ratio there is between the vibrating

frequencies. This was demonstrated with a much-cited diagram in the 1863 treatise *Die Lehre von den Tonempfindungen* (Figure 3.3).

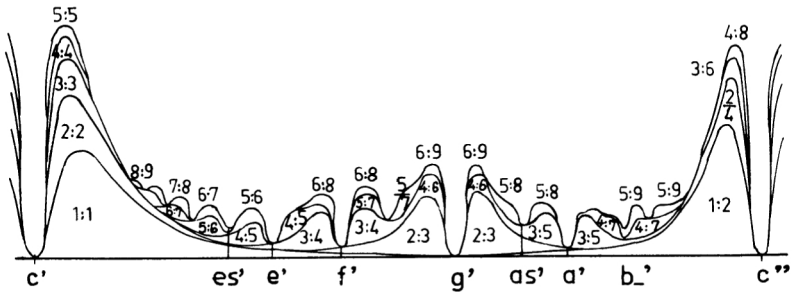


Figure 3.3. Helmholtz's beat diagram. The ratios refer to proportions of string lengths. The low points on the curve present the points where the beats are at their minimum. (Helmholtz 1954: 193.)

Figure 3.3 reflects Helholtz's theory and categorization of consonances:

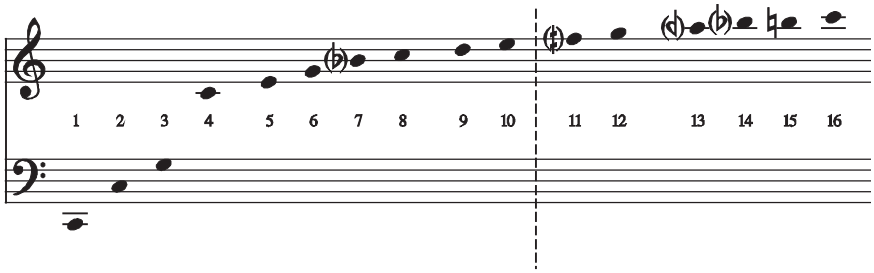
1) Absolute consonances (the octave, the twelfth, and the double octave)
2) Perfect consonances (the fifth and the fourth)
3) Medial consonances (the major sixth and the major third)
4) Imperfect consonances (the minor third and the minor sixth) (Helmholtz 1954: 194–195.)

After these, the level of dissonance gradually increases (ibid.). In contrast to Rameau's theory, Helmholtz sees the major sixth as more consonant than the minor third. This is also visually demonstrated in the diagram: the curve at the point of the major sixth (*a'*) is obviously lower than the minor third (*es'*). Although Helmholtz founded his theory on the much-developed empirical sciences, the basic consonance/dissonance division did not change much from those of Zarlino and Rameau. "Although [Helmholtz] reasoned that no clear physiological dividing line separates consonance and dissonance, his harmonic theory accepts the traditional *senario*-based categorization" (Green & Butler 2002: 261). This line of thinking has prevailed until modern times.

In the twentieth century there have been many attempts to solve the consonance/dissonance problem; from Pythagorean revisions (see e.g. Kolinski 1962; and his critique in Tolonen 1969: 65–66) to the rejection of the whole concept that is most strongly manifested in the twelve-tone equality of, for example, Schoenberg's writings. Although theorists have made different kinds of interval hierarchies based on different reasoning (cf. Kolinski 1962, Tolonen

1969: 196–197, Schoenberg 1978: 18–22), for the main corpus of modern consonance/dissonance theories it is still the Zarlino-Rameau-Helmholtz axis that is the main point of departure. Furthermore, what is particularly important is that it has been accepted that our present tone system is not wholly based on natural principles, but has developed more or less by accident. For example, Arnold Schoenberg (Schoenberg 1978: 25) notes this phenomenon when striving towards a new tonal system that would eventually lead to twelve-tone equality.

"To the turn of [the twentieth century] it became more and more common to think that the minor seventh and the major second should be included as consonances" (Tolonen 1969: 200, cf. Kolinski 1962). This seems reasonable for most Western musical practice from that time to the present. For instance, the minor seventh (and the tritone) are so widely exploited in dominant seventh chords that they are hardly anymore thought of as dissonances. This is yet another example of how musical practise (as it should) has a major influence on music theory. By comparison, for Rameau (e.g. 1971: 52–53) the dominant seventh structure was the archetype and the source of all dissonant chords. A Finnish scholar Jouko Tolonen (1969: 200) has sought theoretical justification for the inclusion of the minor seventh in "a new tone system". He suggests that the overtones up to the tenth to be included in the system (Example 3.11). Tolonen's division would make all ratios up to 10:9 consonances. Even though Tolonen (1969: 200) concludes that this kind of tone system has not been successfully put into practise, there is some evidence of practical applications – at least in the field of popular music. "The 'blue 7th' of jazz […], sometimes thought of as representing the ratio 7:4, is indeed characteristically produced on the cornet or trumpet by overblowing to the seventh natural note" (Lindley et al. 2003). Inevitably, this practise resembles the Delta blues practise of using dominant seventh chord structures on all chord degrees. The advantages and problems of Tolonen's theory for heavy metal need clarification with regard to the effect of distortion, which will be further addressed in Chapter 4.5.



Example 3.11. Harmonic series of C *divided according to Tolonen's (1969: 200) expanded theory of consonance.*

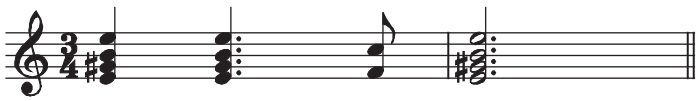
The sensation of consonance is not fixed, but rather dependent on different factors, which raises questions about the "relief of tonal tension" criterion (Palisca & Moore 2006). It has been suggested that approximations of simple ratios are sometimes felt equally as pleasing as the exact simple ratios (e.g. Moore 2003). This is well demonstrated by the tuning of a piano, in which only the octaves conform to just intonation. The perfect fifth and the third may be heard as consonances, despite the fact that they are not perfectly in tune. Furthermore, it has been established that in melodic contexts musicians tend to favour slightly greater ratios than perfect (see e.g. Lindley et al. 2003). Despite the physical and psychophysical facts, it is with no doubt that a cultural-based learning of a certain tonal language plays an important part in the judgement between pleasing and displeasing intervals. Many of the aforementioned scholars have made suggested this. Zarlino (1968: 53) states that

> […] every composition, counterpoint, or harmony is composed principally of consonances. Nevertheless, for greater beauty and charm dissonances are used, incidentally and secondarily. Although these dissonances are not pleasing in isolation, when they are properly placed […] the ear not only endures them but derives great pleasure and delight from them.

Rather ambiguously, Fux (1971: 97) comments on the matter: "[…] the more perfect a consonance, the less harmony it has". On the other hand, Fux's contemporary, Rameau (1971: 6–7) insists that "[…] arrangement of notes, conforming to the order of the numbers and the divisions of the string, gives the most perfect harmony imaginable, as everyone can judge for himself". Whatever the preferences, it is clear that a cultural criterion is much present in the judgements made in differentiating between consonance and dissonance.

At the turn of the twentieth century notions of so-called "functional" consonance/dissonance have increased – although they have been present in theorists' statements for centuries. "[Functional approach] contends that an interval or chord is dissonant or consonant according to whether or not it requires a resolution" (Kolinski 1962: 66). Resolution requirements can be divided in two types: 1) intervals that need to resolve within a chord, and 2) intervals (or chords) that need to resolve within a key. Different kinds of passing and neighbouring notes serve as examples of the first category (see e.g. Salmenhaara 1980: 139–162; Aldwell & Schachter 1989: 28–29). The second category includes intervals and chords that may be judged as consonances in isolation; their need for resolution is dependant on their placement within the tonal context. Thus, "the same interval or chord, depending on its harmonic function, may or may not require a resolution and, therefore, be dissonant in one context and consonant in another one" (Kolinski 1962: 66) (Example 3.12). The majority of theories of chord progression in music are based on this principle of func-

tional consonance/dissonance; for instance the theories of both Schenker and Riemann much rely upon this idea (see Chapter 3.4).



Example 3.12. The perfect fifth as a functional dissonance (after Kolinski 1962: 66).

In some musical practi**c**es of the twentieth century and beyond, the category of consonances has been expanded to its limits. For instance, in those forms of jazz and popular music that conform to the rules of major/minor tonal music, major sevenths are treated as consonances having no need for resolution (see e.g. Garcia 1954: 25). This leaves the minor second as the sole dissonant interval (and even that requires no resolution in the context of a dominant seventh with flattened ninth). In conclusion, it is evident that the question of consonance/dissonance distinction is dependent on several, but not mutually exclusive, factors. Furthermore, the boundaries of these categories are ever-changing.

Later discussion on the consonance/dissonance division (Chapter 4) is much built upon the arguments presented here. For the purposes of this study Tolonen's division seems to be a useful starting point. However, some adjustments need to be made, the consideration of which is followed by a discussion of the features of distorted guitar chords.

3.4. Harmonic Function

Scale-degree theories ultimately rely on the major or minor scale as their referential point of departure. Chords are, then, formed by the constituent members of a scale (see Hyer 2002: 734–735; also see Chapter 3.2). On the other hand, function theories treat harmonic relationships as the fundamental characteristic of tonal music. "A function theory differs from a theory of chordal scale degrees (*Stufentheorie*) in that the former goes beyond the description of chords according to their position within the scale and constitutes a systematic ratiocination of chordal relationships around a tonal center" (Bernstein 2002: 796). In this way, function theories may illuminate certain points in harmonic construction of heavy metal that would otherwise be neglected. For instance, heavy metal chords are frequently constructed of notes that seem to fall outside of a prevailing mode (see Chapter 4). Even in the simplest form of scale degree analysis this may prove difficult, and in the worst-case scenario, would be a misleading starting point. Furthermore, plagal cadences are important to heavy

metal. Compared to scale degree theories in general, function theories are less prejudicial and more explicit on handling the matter of plagal versus authentic. Function theories also explicate the idea that several chord degrees may serve as representatives of a single function through chordal substitution, which is relevant not only to larger scale analysis but on a smaller scale as well.

First of all, the central terms have to be introduced and defined. In common-practise use, harmonic function is strongly associated with so-called functional tonality. However, not unlike other theories and models of harmonic structuring, there are still different ways to understand and approach harmonic function and functional harmony. In general use, functional harmony and functional tonality have two different but not totally separate meanings. They may refer to 1) a particular style of polyphony closely connected to traditional voice leading practises found in Western art music in ca. 1600–1910 (see Hyer 2002: 726), much popular music, especially that of Tin Pan Alley (see e.g. Middleton 1990: 193; Forte 1995; Hitchcock 2005) and jazz music of the 20th century (e.g, Hyer 2002: 746–750), or to 2) general relationships of harmony where chords relate to one another and to the central focal point in hierarchic order. In most treatises of Western music theory, the first postulate prevails as a basis for harmonic construction in the common-practise era of Western art music and related styles such as Tin Pan Alley or traditional jazz. This view is also shared by many analysts of popular music. For instance, Walter Everett (2004) classifies rock's tonal systems in Schenkerian terms in a way that is much governed by traditional voice leading rules; Allan Moore (2001: 53), on the other hand, defines functionality in chord progressions by "degrees of probability". However, since traditional voice leading is often absent or unclear in heavy metal, as also noted by Everett (2004: sections 23–25), it seems more useful to follow the second postulate that defines tonality and harmonic function in more general terms. For a start, in most heavy metal there generally is a clear tonic or central/focal point, against which other harmonic constructions are perceived. "Properly speaking, 'functionality' in tonal music concerns the behaviour of chords in relation to tonic" (Bernstein 2002: 796). Daniel Harrison (1994) seems to have adopted this stand point. Harrison approaches late nineteenth and early twentieth century music in terms derived from Riemannian theory. In developing a function theory of his own, he shows that although a piece of music may be suffused with chromaticisms, the harmonic function of tonal relationships may be clearly present. From this point of view it is hard to find a convincing justification as to why any music with a tonic or a central tone should not be regarded as "tonal" in some ways (cf. Schoenberg 1954: 2). Furthermore, following the most basic definition of harmonic function and tonality, many other kinds of Western music besides that applying "classical harmony" may be thought of as functional. The kind of rigorous view on func-

tional tonality expressed by, for example, Forte and Gilbert (1982: 105) can be "misleading in that it assumes all other harmonic practises to be without function" (Tagg 2003b: 535). These issues are further addressed later on.

In the following, there is a brief presentation of the theory of harmonic function concentrating on those aspects that may be considered relevant to heavy metal. Some controversial ideas that, at their best, have vague connections to the present-day harmonic thinking are left outside the discussion. For instance, Riemann's rigorous dualism that lead him to spell major triads from the lowest note and minor triads from the top note (e.g. Mickelsen 1977: 35–38) is here considered of little if any relevance to heavy metal.

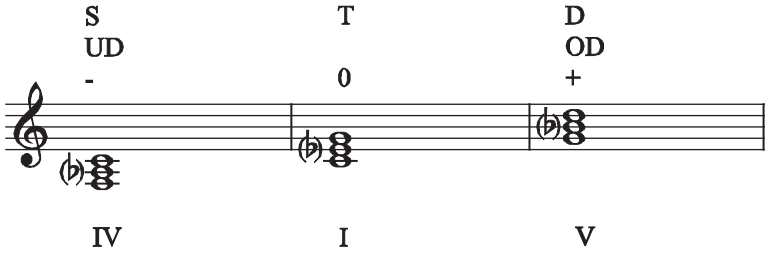
The starting point for the theory of harmonic function is the fundamental chordal relationships of the perfect fifth that were introduced by Jean-Philippe Rameau as two primary forms of cadence. In *Génération harmonique* (1737) Rameau names Dominant-Tonic and Subdominant-Tonic relationships as perfect and imperfect cadences (*cadence parfaite* and *cadence imparfaite*; in modern terms: "authentic" and "plagal"), respectively (e.g. Hyer 2002: 733–734; cf. Riemann 1961: 480–483). The two progressions form the basis for function theories. The first actual theory of harmonic function originates with Hugo Riemann (1849–1919). Essentially based on Zarlino and Rameau, Riemann's concepts were much influenced by studies on musical acoustics conducted by Hermann von Helmholtz (1821–1894). These were mingled with the dualist theories of Moritz Hauptmann (1792–1868) and Arthur von Oettingen (1836–1920), which from time to time are thought of as being influenced by Hegelian philosophy (cf. Klumpenhouwer 2002; Harrison 1994: 221–223). Regardless of the extent of revisions made after Riemann, function theories all rely on dividing chords (and harmony) into three distinct categories, namely Tonic (**T**), Subdominant (**S**), and Dominant (**D**). These three functions have their clearest expressions in the primary chords (or *Klänge*; see Mooney 2006): I for Tonic, or the tonal central point, and V and IV for Dominant and Subdominant, respectively, to represent harmonic tension formed a fifth above (**D**) and below (**S**) the tonic.

> Chordal progressions (also melodies, since they exhibit the principle of chordal progressions in its simplest form) are heard much as one hears the relationship of chords to a main *Klang* (Rameau's *Centre harmonique*, the tonic) against which these chords, being harmonically related, are made intelligible. The two primary harmonies in question are those which were discovered long ago by musicians but were first theoretically established by Rameau. They are the dominant (the closest related *Klang* by an ascending fifth) and the subdominant (the closest related *Klang* by a descending fifth), for which these a purely diatonic melody can be rendered. (Riemann 1977: 218; cf. Riemann 1961: 523–524.)

For Riemannian harmonic theory, it is essential to distinguish between two Dominants of equal importance – upper and lower, i.e. Dominant and Subdominant – instead of recognizing only one as, for example, in Schenkerian theory, which is ultimately based on the Dominant-Tonic relationship. Daniel Harrison (1994: 36) describes harmonic function in terms of what he calls a "three-termed dualism".

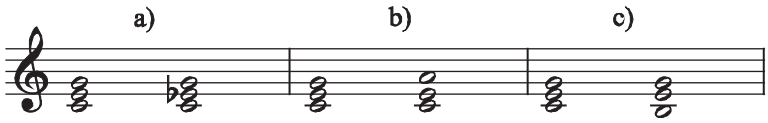
> The starting point – or, better, center – of a three termed dualism is a neutral element that has attributes different from those of its flanking members. Centers, thus, cannot be described adequately as a combination of the outer terms, but only as special and theoretically privileged entities that actually determine the outer terms. In the group of integers under addition, for example, zero is a center flanked by positive integers on one side and negative on the other. These outer terms (positive/negative) obtain meaning only through the definition of zero as the center.

The arguments presented above are illustrated in Example 3.13 with the inclusion of Riemann's earlier terms for Dominant (*Oberdominante*, "over-dominant", OD) and Subdominant (*Unterdominante*, "under-dominant", UD) (e.g. Harrison 1994: 278; cf. Riemann 1961: 486; cf. Louis & Thuille 1913: 8–10).



Example 3.13. Tonic ***Klang*** *surrounded with negative/lower and positive/upper Dominant* ***Klänge*** *in the key of C.*

In Riemannian theory, all chord structures are representatives of the three primary functions via operations of substitution and variation. Thus, more than one chord could represent a given tonal function. Shown here in simplified form (Example 3.14), the basic harmonic transformations of a primary function are the *Variant* (in English terminology: "parallel") which correlates major and minor triads having the same fifth (e.g. C major/C minor), the *Parallel* ("relative") which correlates major and minor triads that share a common major third (e.g. C major/A minor), and the *Leittonwechsel* ("leading-tone exchange"), which relates triads that share a common minor third (e.g. C major/E minor) (Hyer 2002: 736; Cohn 1997: 1, 62n3).

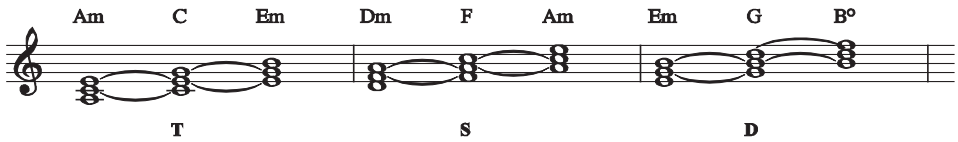


Example 3.14. C major triad with its (a) Variant*, (b)* Parallel*, and (c)* Leittonwechsel.

"In terms of concrete chordal structures, then, harmonic function is more about similarity than equivalence" (Harrison 1994: 37). This concept much resembles Wittgenstein's "family portraits" (cf. Martin 1996: 38); Riemann, however, borrowed the word "function" from mathematics:

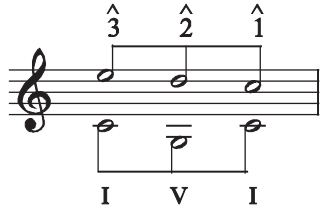
> a D minor triad, for instance, can be heard as the subdominant parallel (or **Sp**) in C major by virtue of the interval (the major third F-A) it maintains in common with the subdominant F major (or **S**). D minor and F major are in this sense two possible values for the same subdominant function. (Hyer 2002: 736.)

Riemann himself did not recognize any limit for operations of chordal substitution; ultimately, any chord could be interpreted in terms of any function (see e.g. Harrison 1994: 285–287); particularly striking in Riemann's examples is that, at will, a dominant chord may be interpreted as a Tonic (ibid.). Consequently, being less than easy to comprehend, the practical application of the theory did not receive wide acceptance until revisions had been made by others. Revisions towards a higher degree of practical applicability were made, among others, by Hermann Grabner (1974) and Diether de la Motte (1987), who both simplified Riemann's theory to a considerable extent. An important revision is the abandonment of the concept of *Leittonwechsel* in determining "secondary" harmonies; the new theories relied on third relationships instead – every "primary function" has two "secondary functions" a third below and above (Example 3.15). For instance, Grabner's revision takes from Riemann only the analytic labels. By doing this, it moves the theory towards the Roman numeral system; for instance, with secondary chords "only their relationship – not their derivation from – primary triads needs theoretical explanation" (Harrison 1994: 305). A similar line of thought is presented in Motte's (1987: 89) *Harmonielehre*. These simplifications concerned themselves mainly with analytic labelling, and much of the interpretative value that was made possible by the enormous flexibility of Riemann's theory was lost.



Example 3.15. Grabner's definition of functional third relationships (after Harrison 1994: 305).

The following pages, then, discuss the relevance of harmonic function to heavy metal. First of all, the distinction of two separate Dominant functions is quite useful for analyzing heavy metal. This distinction between two Dominants constitutes a fundamental difference between Riemannian and Schenkerian views. Basically, in Schenkerian theory Subdominant function is hierarchically a subject to the Dominant (e.g. Schenker 1979: 33, fig. 16; cf. Everett 2004); sometimes the Subdominant as an individual structural element is forbidden altogether (e.g. Schenker 1979: 14, fig. 6). In his most cited work *Der freie Satz* (1935) Schenker emphasizes harmonic understanding in long time-spans. For Schenker, the ideal musical structure is found in the *Ursatz* or "fundamental structure" (Example 3.16), which supposedly underpins any significant piece of music, and to which a piece could be reduced when stripped of its surface-level prolongations.



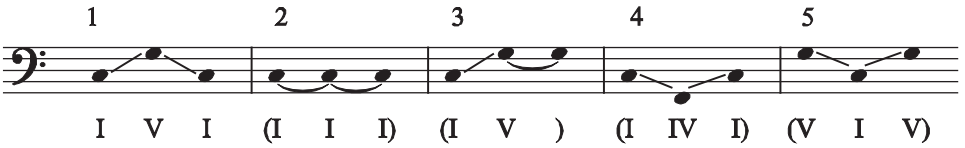
Example 3.16. Ursatz *(after Schenker 1979: fig. 1; cf. Oster 1979: 4n3; cf. Drabkin 2002: 819).*

As with most of his contemporaries, Schenker seeks justification in the natural sciences. "As in the overtone series, in the bass arpeggiation [*Bassbrechung*] the ascending direction takes priority" (Schenker 1979: 14). In short, it is fundamental to the Schenkerian view that the fundamental bass line first ascends a fifth from the Tonic and ultimately descends back to it. Schenker calls this fundamental bass line that presents harmonic progression I-V-I a "sacred triangle" (see Example 3.17).

> May the musician always carry in his heart the image of the bass arpeggiation […]! Let this triangle be sacred to him! Creating, interpreting – may he bear it always in ear and eye! (Schenker 1979: 15.)

Furthermore, Schenker introduces forbidden structures (see Example 3.17; corresponding figures are included in the following quotation):

> [F]orms such as those shown in 2) through 5) are out of the question:
> at 2) the arpeggiation is completely lacking;
> at 3) the descending arpeggiation is missing;
> at 4) the arpeggiation moves through the IV instead of the V;
> at 5) the descending direction comes first, in opposition to nature.
> The two forms shown at 2) and 4), as they stand, express no motion whatsoever and thus do not signify an artistic realization of a chord.
>
> (Schenker 1979: 14.)



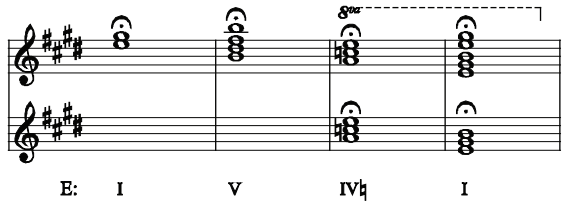
Example 3.17. Schenker's examples on bass lines, including the "sacred triangle" (1) and the four "false" ones (2–5) (reproduced from Schenker 1979: fig. 6).

Functional theories provide a different perspective on this.

> Briefly put, the exploitation in much tonal music of what has been called the Tonic-Dominant axis has discouraged the solid theoretical formation as well as the compositional use of an independent Subdominant function enjoying the same prerogatives as the Dominant. In its place is commonly installed a syntactic something called predominant or dominant preparation. (Harrison 1994: 48–49.)

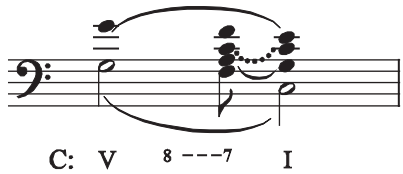
The idea of the Subdominant as subservient to the Dominant is in sharp contrast with the musical practices of some styles. In heavy metal, the Subdominant function frequently prevails in cadences, plagal systems are often essential. The central role of Subdominant function is suggested to have its roots largely in West African music, and (subsequently) blues and boogie-woogie (cf. Van der Merwe 1989: 212). However, there are numerous examples of plagal cadences in so-called art music. For instance, Felix Mendelssohn used the V-IV-I progression in *A Midsummer Night's Dream* (Example 3.18). Harrison (1994: 33–34, 96–102) gives examples plagal systems in the works of Schubert and Brahms. In his earlier work, Schenker (1954: 224) also acknowledged the use of plagal cadences (at least at the local level). For instance, he gives examples of the V-IV-I cadence in works of Ludwig van Beethoven and Johannes

Brahms. It may be argued that plagal systems are not solely restricted to nor they are a special feature of only blues-based popular music, since they appear to be an important part of Western music in general.



Example 3.18. A plagal cadence in A Midsummer Night's Dream*, Overture (reduction and analysis reproduced from Salmenhaara 1980: 202; cf. Aldwell & Schachter 1989: 355).*

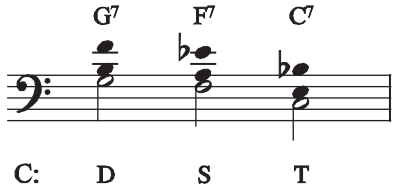
However, for music theorists in the field of popular music, the so-called blues cadence has proved to be problematic. Example 3.19 shows a recent Schenkerian interpretation; an archetypical blues cadence V-IV-I (bars 9–11 of the twelve-bar blues formula) is analyzed as a "softened authentic cadence" (Everett 2004: section 18).



Example 3.19. A Schenkerian view on the blues cadence V-IV-I (reproduced from Everett 2004: fig. 12).

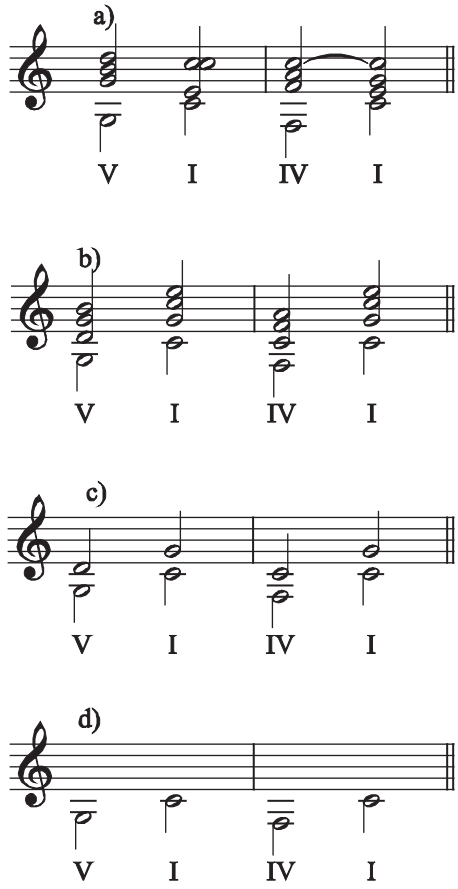
It may be argued that a plagal cadence is somewhat "softer" than its authentic counterpart; however, the Schenkerian view tends to overlook the importance of plagal systems for musical structure. It appears as if the *Ursatz* had achieved such a strong status that the local-level construction of harmony is overlooked. The blues cadence as analyzed in Example 3.19 appears to be an example of this. It seems to reflect the fact that the **DS** cadence is forbidden in traditional text-book harmony; therefore, a fundamentally plagal cadence is explained as authentic. Allowing for the possibility that cadences may be heard in different ways, it is suggested here that the cadence is better understood as shown in Example 3.20: all three functions are treated as equal; the final progression IV-I gives the cadence its plagal flavour. Following the common-practise use of Delta blues and related styles, the cadence here is presented

with dominant sevenths on each scale degree (see Chapter 4.5 for the discussion of *vertical consonances*). In these kinds of musical practices, traditional voice leading has a diminutive role for the functional assignment of chords.



Example 3.20. A functional view on the blues cadence.

The application of the concepts of functional harmony to heavy metal calls for an explanation of how a style of music that is largely based on parallel voice leading in fifths and octaves might express harmonic function. The discussion of this starts with a simple example in C major. Example 3.21a presents authentic and plagal cadences with traditional voice leading. Example 3.21b presents typical guitar voicing for the same cadences, which introduces parallel voice leading. This is also done in Example 3.21c, although this time with power chords. In Example 3.21d there is only one note left (the root) to represent the given progressions. At the very least, if played in sequence, these examples result in a rather similar aural experience. Hence, it could be said that the expression of a harmonic function may be reduced to root progressions; in reverse, root progressions may express harmonic function as well as complete triads. Thus, it is suggested here that the experience of harmonic function does not require so-called traditional voice leading. However, one can easily "hear" imaginary voice leading of the inner parts of Example 3.21a in Examples 3.21b–d. If presented in a tonal context, a mode, structure of a chord and overall harmony together create a sensation of how individual "lines" or "voices" (even if they were not aurally present) are to proceed. In this light there there is no reason why traditional voice leading should be crucial in defining harmonic function.



Example 3.21. Authentic (V-I) and plagal (IV-I) cadences in C major: a) triads with traditional voice leading, b) consecutive triads, c) consecutive power chords, d) chord root progressions.

The following discussion will elaborate on the matter. Most theories of harmonic function emphasize triadic construction in concept and nomenclature. For instance, a pan-German practice of using capital and lower-case symbols in designating major and minor chords, respectively, serves as an example (see e.g. Motte 1987). This stand-point is understandable regarding the styles of music for which function theories were developed. In the common-practice era of tonal music it has been essential to differentiate the major and minor quality.

However, this stand point is not entirely practical for heavy metal analysis, since much of its harmonic organisation is not based on triads. In most cases, differentiating major and minor triad is not essential; especially when

dealing with power chords, this distinction becomes rather irrelevant. Furthermore, heavy metal harmony much relies on functions other than primary ones. In this regard Daniel Harrison's (1994) understanding of harmonic function seems to be rather useful for heavy metal. Harrison bases much of his theory on scale degree components and their role in expressing harmonic function. One of the most important aspects for the theory and analysis of heavy metal is the attention given to progressions other than those which are fifth-related. Furthermore, Harrison's nomenclature is less than rigid; he commits himself to only the three most basic function symbols, which gives the analyses a great degree of flexibility. Harrison's concepts are presented in the following paragraphs, and modified when necessary to meet the needs of heavy metal.

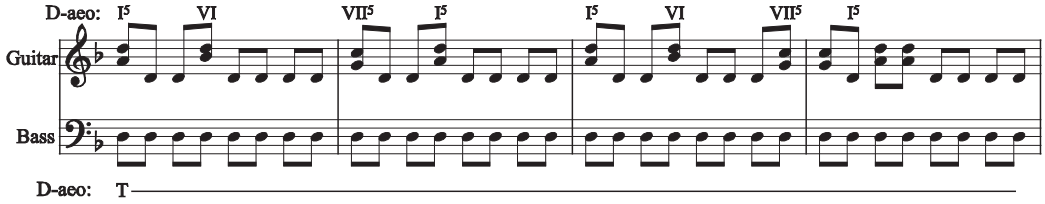
"Harmonic function […] may be a product not of chords but rather of the constituents of chords" (Harrison 1994: 41). As presented in the examples above, chord roots may be reduced to individual scale steps that relate to another in functional relationships. This is especially important to heavy metal: the inner parts of harmony frequently form a "chord-melody" (see Salmenhaara 1980: 392) that is only there to fill in the space between the highest and the lowest part. An important aspect to Harrison's study is his exploration of the functional roles of scale degree components. These roles have been implied before, if not fully explicated, in Rudolf Louis and Ludwig Thuille's *Harmonielehre* (1913: 10; cf. Harrison 1994: 96). Figure 3.4 represents Harrison's view on the scale-degree components of the primary triads; the "labels on the right side of the figure denote the role that these scale degrees play in expressing harmonic function […]" Harrison distinguishes three functional roles: "base", "agent", and "associate".

$\hat{1}$	$\hat{5}$	$\hat{2}$	← associates
$\hat{6}$	$\hat{3}$	$\hat{7}$	← agents
$\hat{4}$	$\hat{1}$	$\hat{5}$	← bases
Subdominant	Tonic	Dominant	

Figure 3.4. Scale degrees and their functional descriptions (after Harrison 1994: 45).

"In tonal music, the fifth relationship is a fundamental principle of harmonic organization" (Harrison 1994: 45). Functional bases – that are essential to the fifth relationships in functional tonal music – may be interpreted as re-

ductions of the three primary functions **T**, **S**, and **D** (cf. Example 3.21 above). A functional base must be distinguished from the chord root; the root relates to a single chord whereas the base relates directly to the tonal centre. For instance, the cadential 6/4 chord with its resolution to the dominant may be interpreted as suspension-resolution motion against the Dominant base (Harrison 1994: 47). The common-practise nomenclature V^{6-5}_{4-3} reflects this view. However, some interpret the same progression as I^{6}_{4}-V (e.g. Salmenhaara 1968: 40). The latter nomenclature emphasizes chord roots at expense of function; in this view, the first chord is fundamentally built on I and the second on V. Harrison further (1994: 47–48) elaborates on the matter with an example of the much-debated II^{6}_{5} chord, "[o]ne can hear both a chord root [$\hat{2}$] within the context of the chord itself and a functional base [$\hat{4}$] within a context of the key". Moreover, pedal points serve as an example on how a single function prevails even when the chords above are in motion (ibid.: 47). This is the case in a number of heavy metal riffs (Example 3.22).



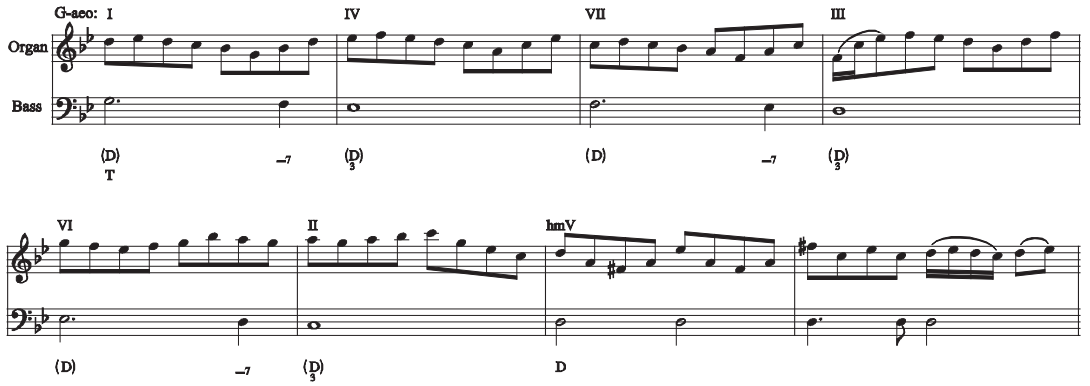
*Example 3.22. Tonic pedal point in Accept's "Princess of the Dawn" (*Restless and Wild *1982) (ca. [0:08–0:15]).*

According to Harrison (1994: 46), a functional base works under following conditions:

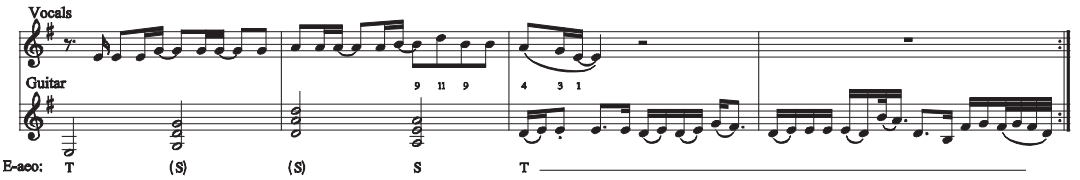
> Condition 1. The base is the lowest sounding voice in a chord.
> Condition 2. If not in the lowest voice, the base must be accompanied by the functional agent.

A functional base-relationship may be extended to secondary dominants and subdominants. As explained before, voice leading is not considered here as a major factor in expressing harmonic function. Thus, secondary dominants do not have to be major chords as in common-practice harmonic theory; it is here considered to be enough that a chord root has a base-relationship to the next chord. Deep Purple's "Burn" (*Burn* 1974) illustrates this (Example 3.23). The organ part is extremely Baroque-like, as is the use of accompanying chords

with inversions.[12] The inversions in mm. 2, 4 and 6 provide examples of Harrison's Condition 2: functional bases are not in the lowest voice, but are accompanied by a functional agent. Whereas "Burn" exploits the whole circle of diatonic fifths with Dominant relationships, Subdominant chains tend to be shorter. A typical Subdominant chain progression is presented by Black Sabbath in "A National Acrobat" (*Sabbath, Bloody Sabbath* 1973) (Example 3.24). Furthermore, besides the "overlapping argumentation" (see chapter 3.5), there is interesting non-tertial counterpoint between the guitar and the vocal part in mm. 2 and 3 (intervals are numbered in the example).



Example 3.23. Dominant chain in "Burn" (ca. [4:24 – 4:34]).



Example 3.24. Subdominant chain in "A National Acrobat" (ca. [0:28 – 0:54]).

Whereas functional associates are "entirely dependent on the presence of agents or bases for what little functional power they have" (Harrison 1994: 55) (hence, the name "associate"), functional agents are of special interest regarding heavy metal. Unlike bases, functional agents are solely committed to a single harmonic function; they appear in only a single primary triad whereas bases $\hat{1}$ and $\hat{5}$ appear in two (see Figure 3.4 above). Thus, the relation of agents

12. Actually, the whole passage much resembles a section from Johann Sebastian Bach's *Toccata and Fugue in D minor*, BWV 565 (BC J37).

to harmonic function is less ambiguous than that of the bases: "[agents] posses a more secure relationship to harmonic function, one not sensitive to placement or dependent on another scale-degree element" (ibid.: 49). Functional agents are especially important to heavy metal, because much of its harmonic vocabulary is not based on primary functions and fifth relationships, but progressions of seconds and thirds instead; one example of this is the much-used Aeolian VI-VII-I cadence. Moreover, agents express modal qualities; the major or minor quality of a mode is defined based on agents (ibid.: 50–55); in major mode (Ionian) agents are major, in minor mode (Aeolian) they are minor. Most of the modes may be distinguished according to this principle (e.g. in Dorian mode Tonic and Dominant agents are minor whereas Subdominant agent is major). However, it has to be noted here that in heavy metal modal qualities are not solely tied to functional agents (cf. Phrygian and Locrian modes, in which also functional associates have a role in determining modality).

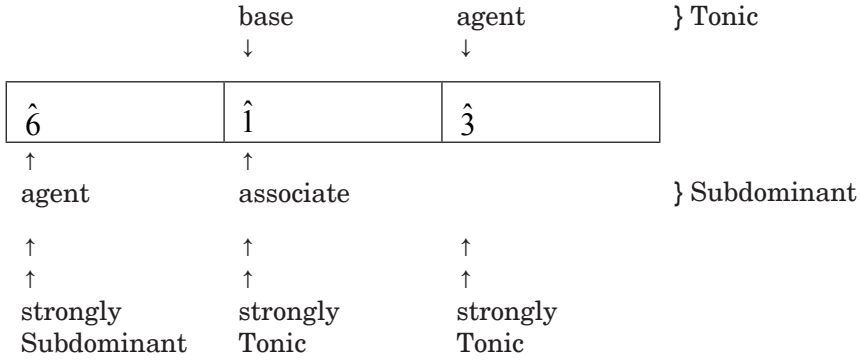
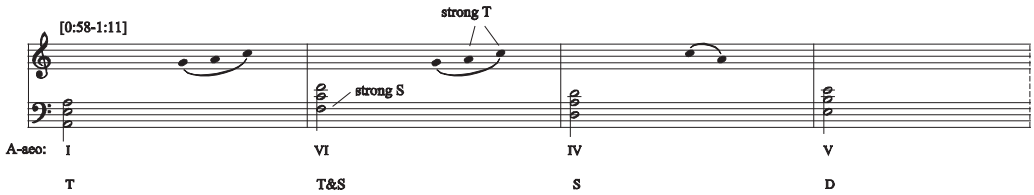


Figure 3.5. Disassembly of VI (after Harrison 1994: 61).

Sometimes two functions act simultaneously. Harrison (1994: 60) calls this "functional mixture" (cf. Motte 1987: 83–85). For example, a VI degree triad can be disassembled into its scale-degree components ($\hat{6}$, $\hat{1}$, and $\hat{3}$), which each represent different functional attitudes (Figure 3.5). $\hat{1}$ and $\hat{3}$ are strong representatives of Tonic function, whereas $\hat{6}$ strongly stands for the Subdominant. Motörhead's "Killed by Death" (*No Remorse* 1983) illustrates this (Example 3.25). The piece is based on an Aeolian I-VI-IV-V progression, which is a minor counterpart of a well-known Tin Pan Alley cliché (cf. Lilja 2007: 145–146). Here, again the VI degree can be interpreted as having features of both Tonic and Subdominant; the chord root (supported by its fifth) is strongly Subdominant, whereas the vocal melody stays on the Tonic base and agent, both being strong representatives of Tonic function.



Example 3.25. Refrain for "Killed by Death".

Voicing in heavy metal is usually conducted in such a way that root progressions are much emphasized. Especially when dealing with power chords, chord progressions may be regarded in rather a similar way to that of the *continuo* bass part in the Baroque; only this time the bass melody is doubled in fifths and octaves. In this line of thinking, harmonic function is mostly dependant on chord root progressions, and far less dependant on the voicing and melodic construction of the upper parts. The understanding of harmonic function in this study is heavily influenced by the acoustic characteristics of distorted guitar chords (see Chapter 4) and by the fact that harmonic function in heavy metal tends to be based on root relations rather than voice leading. Table 3.3 illustrates the way functional symbols are used. The discussion below differentiates between "strong" and "weak" representatives of Tonic, Dominant and Subdominant. They are distinguished by assigning a capital letter for the strong representatives of a function (**T**, **D** and **S**) and a small letter for their weaker counterparts (**t**. **d** and **s**). This way of assigning functional attitude is rather different from those harmonic theories that use pan-German, Weberian-based nomenclature: for those a small letter denotes a minor triad and a capital letter a major triad. As this creates some scope for confusion, the examples below attempt to clarify the operating principles for the use of upper and lower case in the analytical notation.

Functional attitude	Representatives
strong **T**	I (all forms)
weak **t**	III (all forms)
strong **D**	V^5, ionV, ionVII (all forms)
weak **d**	aeoV, aeoVII (all forms)
strong **S**	IV^5, aeoIV, aeoVI (all forms)
weak **s**	dorIV, dorVI (all forms)

Table 3.3. Strong and weak representatives of harmonic functions.

Keeping in mind that heavy metal harmony is largely based on root progressions in seconds and thirds, Subdominant and Dominant agents are of particular interest. In major/minor tonal music $\hat{7}-\hat{8}$ motion is typically present in all discharges from the Dominant (i.e. **DT** and **DS** progressions), whereas $\hat{6}-\hat{5}$ does the same in discharges from the Subdominant (**ST** and **SD**) (Harrison 1994: 92–93, 96). Discharges from agents express their functions in the clearest way when they move in semitones. Harrison (1994: 52–53) concludes that a minor $\hat{6}$ expresses the Subdominant function more strongly than a major one; the same idea is applied in reverse to $\hat{7}$, in which the major expresses the Dominant function more strongly than the minor. This is the basis for the adaptation of such terms as "strong" and "weak" for the discussion of functional representatives. Although it has been said that "*weak* qualities have no place in artistic structure" (Schoenberg 1954: 6n1), the choice of terminology here is to be understood as metaphorical; these differences might as well be described as, for example, "large" and "small" or "sharp" and "blunt" (cf. Schoenberg 1978: 116n).[13] Applied to chord roots, this interpretation has the following consequences. Subdominant is more strongly represented by Aeolian VI than by Ionian VI, and Ionian VII is a stronger representative of Dominant than Aeolian VII. Hence, in one of the most frequent heavy metal chord progressions – the Aeolian VII-VI-I – Subdominant is presented in its strong form (marked with a capitalized **S**) and Dominant in its weak (marked with a lowercase **d**) (Figure 3.6). This seems to express rather well the relationship of the two dominants in this progression.

Aeo:	VI	VII	I
	Subdominant (strong)	Dominant (weak)	Tonic
	S	d	T

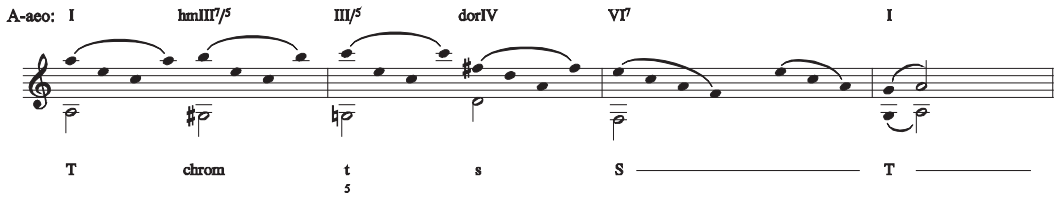
Figure 3.6. Harmonic functions in Aeolian VI-VII-I cadence.

Considering the relative strength of the two Dominants, the Aeolian cadence may be thought as more plagal than authentic; this is despite that fact that the Dominant immediately precedes the Tonic. To be consistent, this has

13. Arnold Schoenberg avoids the expression "weak" when discussing root progressions: "The term strong is used because great changes in the constitution of the chord are produced. […] The term ascending is used [for certain progressions] in order to avoid the term weak progressions in contrast to strong. Weak qualities have no place in an artistic structure." (Schoenberg 1954: 6n1.) Elsewhere, he stresses the metaphorical nature of his terms: "This is only a metaphor, as is our designation of pitches as high and low. Since the tones are literally neither high nor low, we could as well express this distinction by means of other antitheses: for example, sharp and blunt, short and long, etc." (Schoenber 1978: 116n.)

to be compared to what has been said earlier about the blues cadence, which was defined as plagal on the basis that Subdominant precedes the Tonic. The explanation is founded on the different nature that functional agents and bases have. As said, agents are either "strong" or "weak" in their functional attitude; functional bases, on the other hand, are regarded as equally strong in expressing their functional attitude. Consequently, if both Dominant bases are in a sequence, it is likely that the one of the two that immediately precedes Tonic defines the plagal/authentic essence of the cadence; the blues cadence is one example of this. Dealing with functional agents is another matter; as in the case of the Aeolian cadence, the relative strong/weak axis is also a factor.

Both Dominants are here considered strong when they are represented by chords on V and IV. Distorted chords are considered as unambiguous representatives of their root tone, especially when they appear as power chords, major triads, or dominant seventh chords (cf. Chapter 4). In one of these forms, V and IV are considered to be strong in their functional attitude. However, in cases when distortion is not a factor, chords on V and IV rely on functional agents in order to express their functional attitude. A minor triad on V is a less strong representative of Dominant than a major one; likewise, a major triad on IV (e.g. dorIV) is a weaker representative of Subdominant than its minor counterpart. In other words, a weak functional agent may weaken a functional attitude of a harmony constructed on a functional base. Led Zeppelin's "Stairway to Heaven" (*Led Zeppelin [IV]* 1971) gives an example of a weak Subdominant on Dorian IV degree followed by a strong one on Aeolian VI degree (Example 3.26).

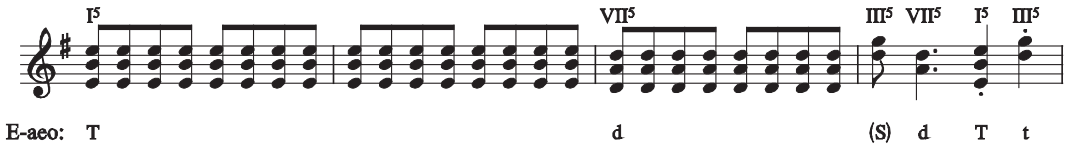


Example 3.26. Functions in "Stairway to Heaven" (ca. [0:00 – 0:08]).

Since the tonic degree has a special place in tonal hierarchy as the central point of a piece or a chordal passage, Tonic is treated a bit differently than both Dominants regarding the strong/weak axis of functional attitude. Here, Tonic function is regarded as having a strong representation in all chordal structures founded on a Tonic base. For example, it makes no difference if the structure is a major triad, a minor triad, or a power chord. Unlike the Dominant and Subdominant agents, chords on Tonic agents are treated as weaker

representatives of their function. If the Tonic attitude relies on the agent, it makes no difference if the agent is based on a major or a minor mode (Ionian and Aeolian III give the most frequent examples on chords based on major and minor Tonic agents, respectively). Although, these cases are regarded as unambiguous representatives of Tonic function, the function is relatively weaker when compared to chords founded on Tonic base.

In addition, III may often be interpreted as a secondary function. This is illustrated with an excerpt from Black Sabbath's "Paranoid" (*Paranoid* 1970) (Example 3.27) that includes one of the most frequently used progressions in heavy metal, namely Aeolian III-VII-I. In this particular case, the first appearance of III is interpreted as a secondary Subdominant and the second appearance as a weakened Tonic.



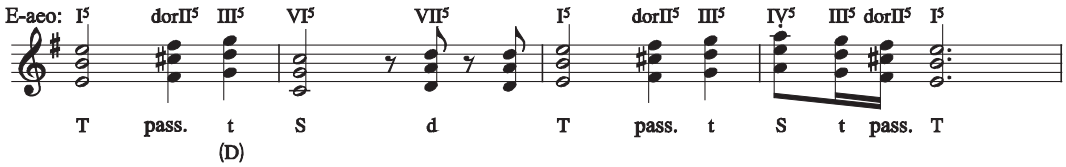
Example 3.27. Secondary subdominant in riff to "Paranoid".

By comparison to any other chord degree, various forms of II have a special and much disputed place in music theory, especially regarding harmonic function. A chord on II degree is usually interpreted in one of the following three ways: 1) as a secondary dominant, especially when it appears in a form of a major triad or a dominant seventh (e.g. Motte 1987: 105–106; Forte 1995: 15–16); 2) as a dominant preparation or a pre-dominant, especially when the bass and/or voicing stresses the Dominant agent $\hat{2}$ (e.g. Salmenhaara 1980: 125–127; cf. Harrison 1994: 60–61; Forte 1995: 117–146; cf. any Schenkerian text); 3) as having an independent Subdominant function, when it appears with its third (i.e. Subdominant base) in the bass or if it resolves to Tonic without an intermediate Dominant (see Salmenhaara 1980: 125–127; Motte 1987: 45; Harrison 1994: 60–61). However, in heavy metal chords on II function differently; in most cases they seem to escape any clear functional assignment.

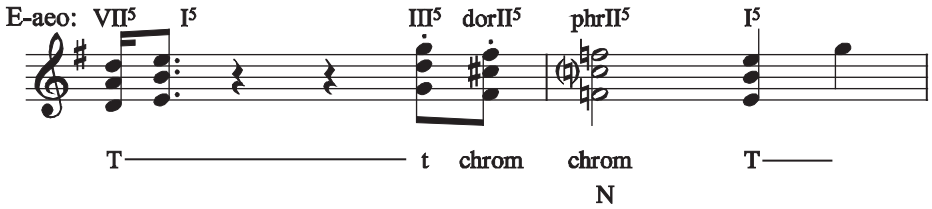
This might be explained by the slightly different harmonic language heavy metal has from the point of view of traditional harmony. For common-practice major/minor tonal music the Ionian/Harmonic minor progressions II-V-I may be regarded as the most fundamental. Whereas these progressions appear in the majority of art music since the Baroque, Tin Pan Alley style popular music, and pre-modal jazz, their appearances in heavy metal is rather infrequent. Instances of II functioning as a secondary Dominant are mostly confined to

Baroque-influenced sequences such as that found in "Burn" (Example 3.23). More often II appears to have other uses in which the harmonic function is not so clear as it is in the context of II-V-I.

Chords on II relatively rarely have anything other than a passing function. Usually they appear as chromatic passing chords or as elaborations of the Subdominant function. In Black Sabbath's "Heaven and Hell" (*Heaven and Hell* 1980) and "War Pigs" (*Paranoid* 1970) (Examples 3.28 and 3.29) power chords on II have passing functions. In "Heaven and Hell" the dorII^5 acts as a passing chord between **T** and **t**. In "War Pigs" there is a chromatic descending from **t** to **T** via two forms of II, a Dorian and a Phrygian. The latter of these could also be seen as a Neapolitan chord. However, a chromatic descent seems to be a more apt analysis for this particular progression.



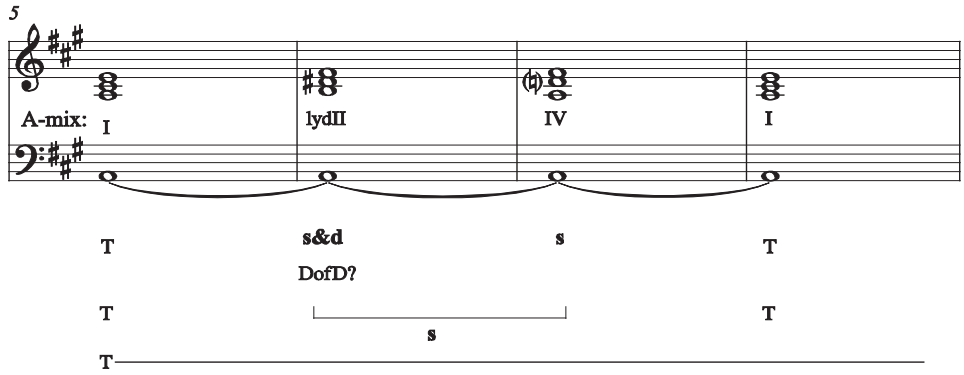
Example 3.28. II as a passing chord in "Heaven and Hell" (guitar riff, ca. [0:00– 0:15].



Example 3.29. II as a chromatic passing chord in "War Pigs" (guitar part, ca. [1:46 – 1:51].

A chord on II may act as an elaboration of the Subdominant function. Deep Purple's "The Mule" (*Fireball* 1971) presents an example of a chord, which at a first glance appears to be a secondary dominant (**D**of**D**) (Example 3.30). However, since it resolves not to the Dominant, but to the Subdominant instead, the interpretation has to be reconsidered. Furthermore, the progression does not sound like a deceptive cadence in the same sense as in traditional harmony. From a functional perspective the II could be explained as follows. The chord has three tones that all seem to represent different functional attitudes. The triad is based on the Dominant associate ($\hat{2}$), which has a relatively weak functional attitude. The fifth of the chord ($\hat{6}$) is a Subdominant agent, in its

major, and thus, weaker form. These two tones contribute to a sense of functional mixture between Dominant and Subdominant. Since both are presented in their weaker forms, however, this is not done very effectively. As a leading tone to the dominant, the third of the triad ($\sharp\hat{4}$) has perhaps the strongest functional attitude of the three tones, although, resolving to the IV, it appears to lose its leading tone function towards the Dominant. After this progression it could easily be reinterpreted as an upper leading tone towards the Subdominant. Even if it is not without doubt, the chord seems to be more tied to a Subdominant than to a Dominant function. Furthermore, the fact that the whole passage is built on a Tonic pedal point lessens the functional expressiveness of the chords above. In conclusion, chords on II seem to have no clear or independent functional expression in all three cases presented here.



Example 3.30. II as an elaboration of Subdominant. in "The Mule" (ca. [1:06 – 1:12]).

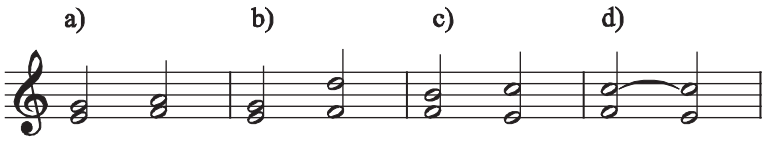
The discussion on harmonic function continues in Chapter 6, which also introduces functional aspects in larger scales of harmony.

3.5. Counterpoint and Voice Leading

Any music that has at least two different pitches sounding simultaneously may be called polyphonic, as opposed to monophonic. This includes "all forms of heterophony, homophony and counterpoint" (Tagg 2003e; cf. LaRue 1970: 48). In academic writing there are two ways of approaching counterpoint: 1) from the point of view of species counterpoint; or 2) in terms of the degree of overlapping articulation.

Both of these are based on the concept of *punctus contra punctus* (i.e. point against point); in other words, putting one melodic line against another. However, there are fundamental differences in the two. The species approach re-

serves the term counterpoint for polyphonic music that is constructed according to traditional voice leading rules; "traditional" denoting here the rules normally attributed to Johann-Joseph Fux (1971: 21–23), but that were, in fact, formed some century and a half earlier (Bent 2002: 560–563). Using Aldwell & Schachter's (1989: 71) terminology, the parts (voices or instruments) relate to each other in the way presented in Example 3.31.



Example 3.31. Voice leading types: a) parallel, b) similar, c) contrary, and d) oblique.

Fux's species for two-part counterpoint are divided according to how the note values of the parts relate to one another. The species are distinguished as follows.

> First species: note against note
> Second species: two notes against one
> Third species: four notes against one
> Fourth species: two notes against one with ties
> Fifth species: combination of species 1–4, with shorter values
> (Bent 2002: 564.)

However, there is a second school of thought on defining counterpoint, which is promoted by, for example, Philip Tagg (2003c, 2003e) and Jan LaRue (1970: 45–48). Here, the distinction is made according to the relative independence of concurrent melodic lines by degrees of "equal activity" and "overlapping articulation" (LaRue 1970: 46), the latter meaning that the concurrent lines do not phrase and cadence together, but rather one after another. "These noncoordinated articulations result naturally from the linear independence characteristic of Renaissance works" (ibid.). For instance, this may be seen in the works of Palestrina (see e.g. Jeppesen 1972 for examples); cadences in many Classic symphonies by, for example, Mozart and Haydn present the opposite types (see LaRue 1970: 46–48). According to this view, Fux's species may be described as having a growing degree of counterpoint according to the number of their species; the fifth species has the highest degree of independence, whereas the first species does not qualify as counterpoint at all.

These opposite definitions of polyphony, then, display very different concerns: one with the vertical organization of simultaneous tones, and the other

with horizontal or linear organization. These types may be described as *homophony* and *counterpoint*, respectively (see Figure 3.7). Homophonic organization has also been called "chordal" (LaRue 1970: 46) or "harmonic" (Salzer 1982: 87). "To the linear chord, horizontal context is of first importance. The vertical arrangement of its intervals has secondary significance." (Forte 1962: 340.) However, both counterpoint and homophony form vertical harmonic structures. They may only be described in relative terms (Tagg 2003e: 558) as interdependent abstract polar opposites. For instance, Johann Sebastian Bach's chorales are more homophonic than the motet of the Ars Antiqua. In the chorale type of composition voices mostly move in the same rhythm at the same time and thus the relative independence of the voices is not very high, whereas in early motet (e.g. Sanders & Lefferts 2008) different voices may have a high degree of independence and the vertical structure is of secondary concern. Voice leading governs the ways both homophony and counterpoint are organized; it simply describes how individual voices or instruments behave in

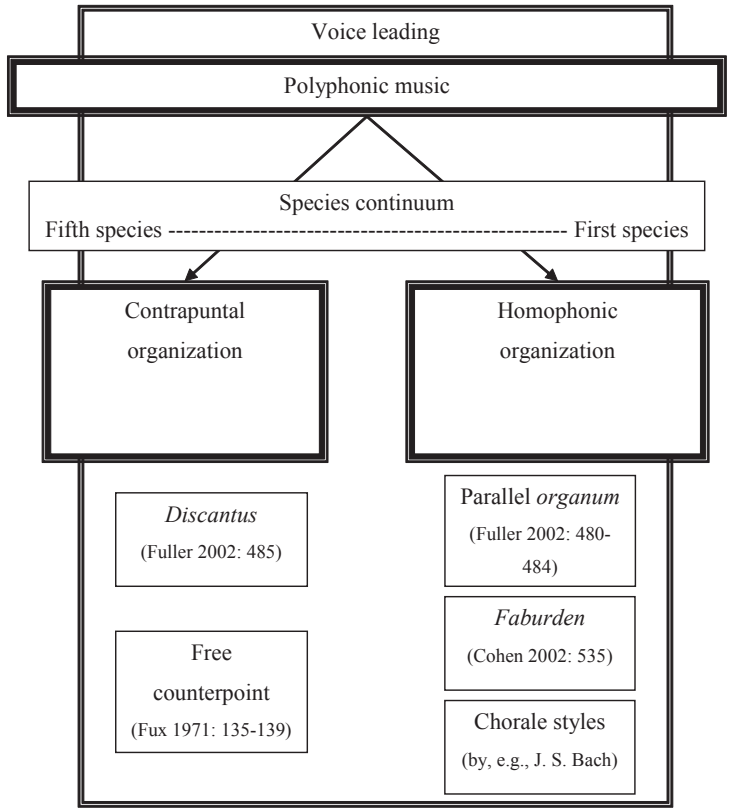
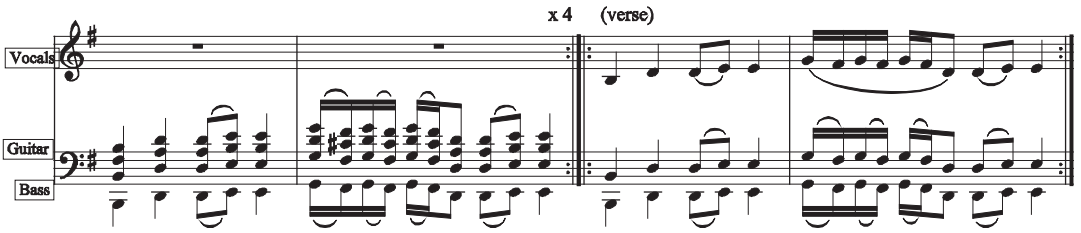


Figure 3.7. Polar opposites of polyphonic music with some conceptual/stylistic examples.

relation to one another. In other words, all polyphonic music is underpinned by voice-leading rules to some extent as shown in Figure 3.7.

Heavy metal is almost always polyphonic, and furthermore, often contrapuntal rather than homophonic. Examples of various types of polyphonic organization in heavy metal starting from simplest forms will follow.

Parallel voice leading is a typical feature for heavy metal as it is for most rock music. Black Sabbath's "Iron Man" (*Paranoid* 1970) presents an example on this. The verse is constructed only of parallel octaves, and thus may be considered as monophonic. The main riff applies parallel fifths and octaves (Example 3.32). Furthermore, as in most Black Sabbath riffs these parallel fifths are *chromatic* and not *diatonic* (or, *real* and not *tonal*; Persichetti 1961: 198), i.e. the exact intervallic structure is applied regardless of the mode in use.



Example 3.32. Main guitar riff and verse of "Iron Man" (ca. [0:28–0:55]).

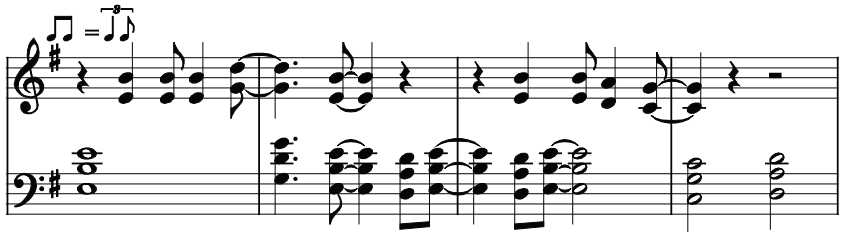
Parallel fifths and octaves are usually banned from traditional harmony and counterpoint. Diether de la Motte (1987: 19) presents two common arguments for abandoning this type of voice leading. First of all, the independence of different parts are said to be compromised because the simple frequency relationships of octaves (and fifths) merge into each other. The second argument is that parallel fifths and octaves "sound poorly". These arguments can be questioned quite easily, as Motte does. The individuality of different parts is no less compromised in the homophonic contrary motion of, say, J. S. Bach's chorale style or in minuets in the classical style (e.g. Mozart's symphony no. 25), where the voices work in co-ordinated articulation. Furthermore, as Motte (1987: 19) argues, why this is not applied also to the perfect fourth, which is also has a simple frequency ratio? The "fifths sound poorly" argument, on the other hand, is even harder to justify; why would the only acceptable sounding contrapuntal interval for several hundred years now sound poorly? As is well known, parallel octaves, fifths and fourths were standard practice for several hundred years in Western music. One may consider, for example, the parallel *organum*, a common type of medieval vocal polyphony (see Fuller 2002: 480–484; Riemann 1961: 76–77; Shepherd 1991: 99). Furthermore, similar practice has been de-

tected in West African music (Schuller 1968: 40–43) and Latin American music (Padilla 2000: 22).

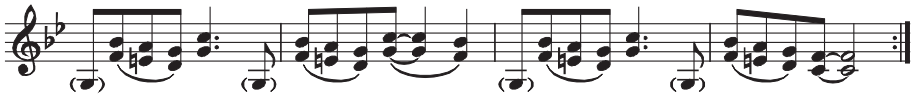
As Motte (1987: 19–20) argues, abandoning parallel fifths and octaves presents an example of dismissing and denying the musical past; "this attitude is well preserved: parallel motions are not artistic" (ibid.). However, in the so-called popular styles parallel motions have never been banned. Van der Merwe (1989: 209–210) argues that Joseph Haydn used a fair amount of parallel fifths in his symphony no. 88, because he intended the composition to follow "popular style". Moreover, the classical style has included the so-called Mozart fifths, denoting the parallel fifths in the chord progression from augmented sixth chord on the VI degree to V (see e.g. examples from Haydn and Mozart in Aldwell & Schachter 1989: 491–492). It maybe of interest that Schoenberg (1978: 62) has rather strict views on the matter: "[the intentional use of parallel fifths] would be dangerously close to asking whether an intended murder is more pardonable than an unintended!" This kind of statement, of course, reflects the stylistic ideals of the time and is not to be taken as a guideline for an analysis of later music that does not always conform to the rules of earlier days. Whether the music is called "art" (e.g. Persichetti 1961: 201–205) or "popular" (e.g. Garcia 1954), parallel fifths and octaves are a part of the twentieth-century harmonic vocabulary.

Whatever the musical style in question, parallel voice leading is perhaps the simplest form of homophonic polyphony. It may be argued that the more simple ratios that are used in parallel voice leading, the less independency the parts have. In the context of the neo-modal music of the late 19th and the early 20th century, voice leading in parallel octaves and fifths has been described as "chord-melodies". This denotes chords that strictly follow a melodic line with an unchanging (diatonic or chromatic) structure (Salmenhaara 1980: 392). This compositional device used by, for example, Debussy and Stravinsky, is natural to heavy metal, where parallel voice leading is tied to the *barré* technique of the guitar; common chords are easy to play in sequences by moving across the fret board without changing the grip. However, this apparently guitar-derived voice leading has resulted in parallel fifths in other instrumental contexts, too. For instance, vocal harmonies in the chorus of Iron Maiden's "Running Free" are executed in this way (example 3.33). The same effect has been noticed in, for example, in the music of the Beatles (Valdez 2002: 98; cf. Moore 1995: 191). Furthermore, guitar technique does not explain the use of parallel fifths or fourths in organ playing; in common keyboard settings a more traditional voice leading would be easier to perform. The question here is clearly about harmonizing a single melodic line with a parallel interval, just like in organum. For instance, several Deep Purple compositions offer examples of this. For instance, the

organ part of "Burn" (*Burn* 1974) presents an example of this kind of "chord-melody" (Example 3.34).



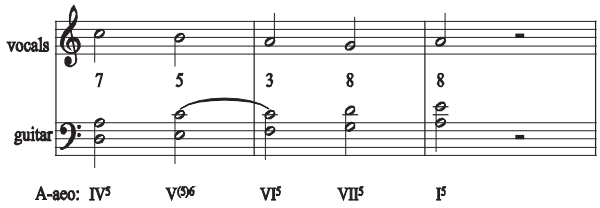
Example 3.33. "Running Free". Vocals on the upper, guitar chords on the lower stave (ca. [2:46–2:51])



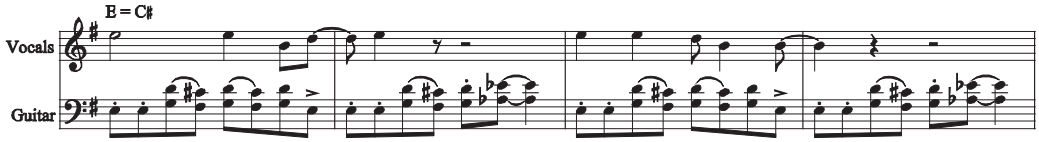
Example 3.34. Riff played by organ and guitar (one octave below) for "Burn" (ca. [0:11–0:21]). Notes in parentheses are played with guitar only.

In Judas Priest's "The Sentinel" (*Defenders of the Faith* 1984) the vocal melody works in contrary and parallel motion against the guitar chords, which themselves apply parallel and oblique motions (Example 3.35). Normally parallel guitar chords above have a low or zero degree of independency. As suggested above, parallel guitar chords actually form a harmonized melodic line. Hence, according to Fux's line of thinking, this passage (like many others) may be seen as two-part counterpoint between the vocal melody and the chord roots. Even though this is just the way that first species counterpoint is constructed (e.g. Fux 1971: 27), adopting the Tagg/LaRue line of reasoning, since the parts move in exactly the same rhythm, this excerpt has a low degree of counterpoint; actually, it could be easily be described as homophonic. The melodic line starts out with a seventh, which is at least unorthodox (cf. Fux 1971: 28). Moreover, this short passage also violates other rules of traditional voice leading (cf. parallel octaves between mm. 2 and 3). Furthermore, although to begin with the seventh does not accord with traditional rules, its resolution does so nicely. However, the contrary motion in the melody achieves a hint of independence. It could be said about the voice leading types (see Example 3.31 above), then, that the independence of parts is minimal in parallel motion and then increases through similar to contrary to oblique motion. The degree of counterpoint, however, increases fundamentally when the parts are moving independently as in Black Sabbath's "Sabbath, Bloody Sabbath" (*Sabbath, Bloody Sabbath*

1973) (Example 3.36). As Philip Tagg (2003c: 551) has noted, much riff-based music is "to a significant effect contrapuntal". The guitar and the vocal parts in this excerpt even follow different modes; the vocal part may be described as E minor pentatonic, whereas the chromatic guitar riff is fundamentally built on E-Aeolian.



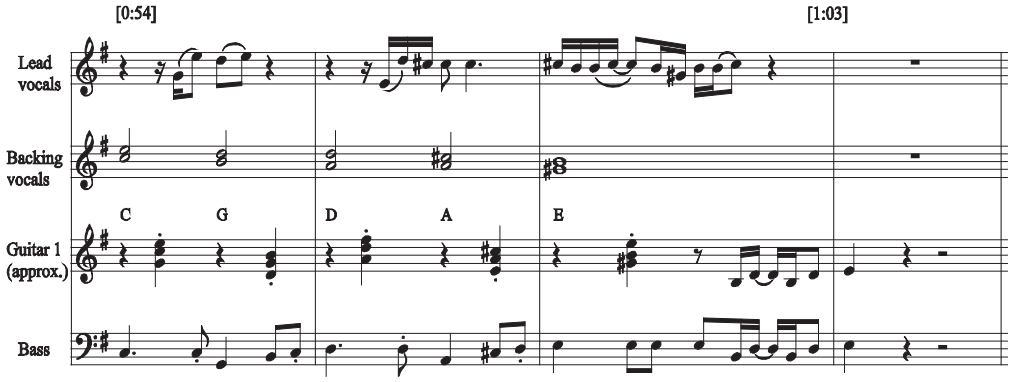
Example 3.35. Reduction of the vocal and guitar parts of "The Sentinel".



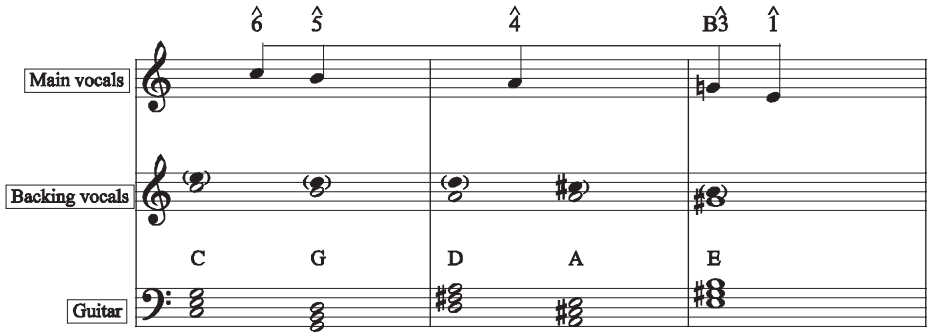
Example 3.36. An excerpt of "Sabbath, Bloody Sabbath" (ca. [3:26–3:33]).

In addition to the parallel voice leading there are more classical continuo-derived practices, too, and quite classical counterpoint between different instrument parts, although with more freely used parallel fifths, unlike in traditional text-book counterpoint. These features can occur separately or all together in the same song. Jimi Hendrix's "Hey Joe" (1983 [1967]) gives another example of counterpoint and homophony (Example 3.37). Backing vocals and the guitar part are homophonic, but are counterpointed by the main vocal and bass parts. Furthermore, there are several kinds of voice leading. Backing vocals abide by traditional voice leading rules with their parallel and oblique motions, whereas the guitar part works, as usual, in parallel motions. It seems clear that the vocal choir is derived from a different tradition than the guitar chords. Reduction of the main melodic/harmonic features of the piece (Example 3.38) shows that the melodic cadence of the main vocal part is not the classical $\hat{2}-\hat{1}$, but its bluesy alternative B$\hat{3}-\hat{1}$ instead (in bebop jazz this melodic cadence is discussed by Martin 1996: 22–23). The main vocal line, which starts as almost the same as the lower backing vocal *obligato*, applies a minor third against the major chord in the last bar, thus giving the excerpt a bluesy pentatonic flavour. However, the song is clearly not pentatonic; the melodies, for instance, are

more of the modal type (Aeolian/Dorian/Mixolydian). Furthermore, whatever blues flavour there might have been is lost in modal decorations later on in the song (as shown in Example 3.37). As discussed, there is interplay of at least three different sources of musical traditions in this song.



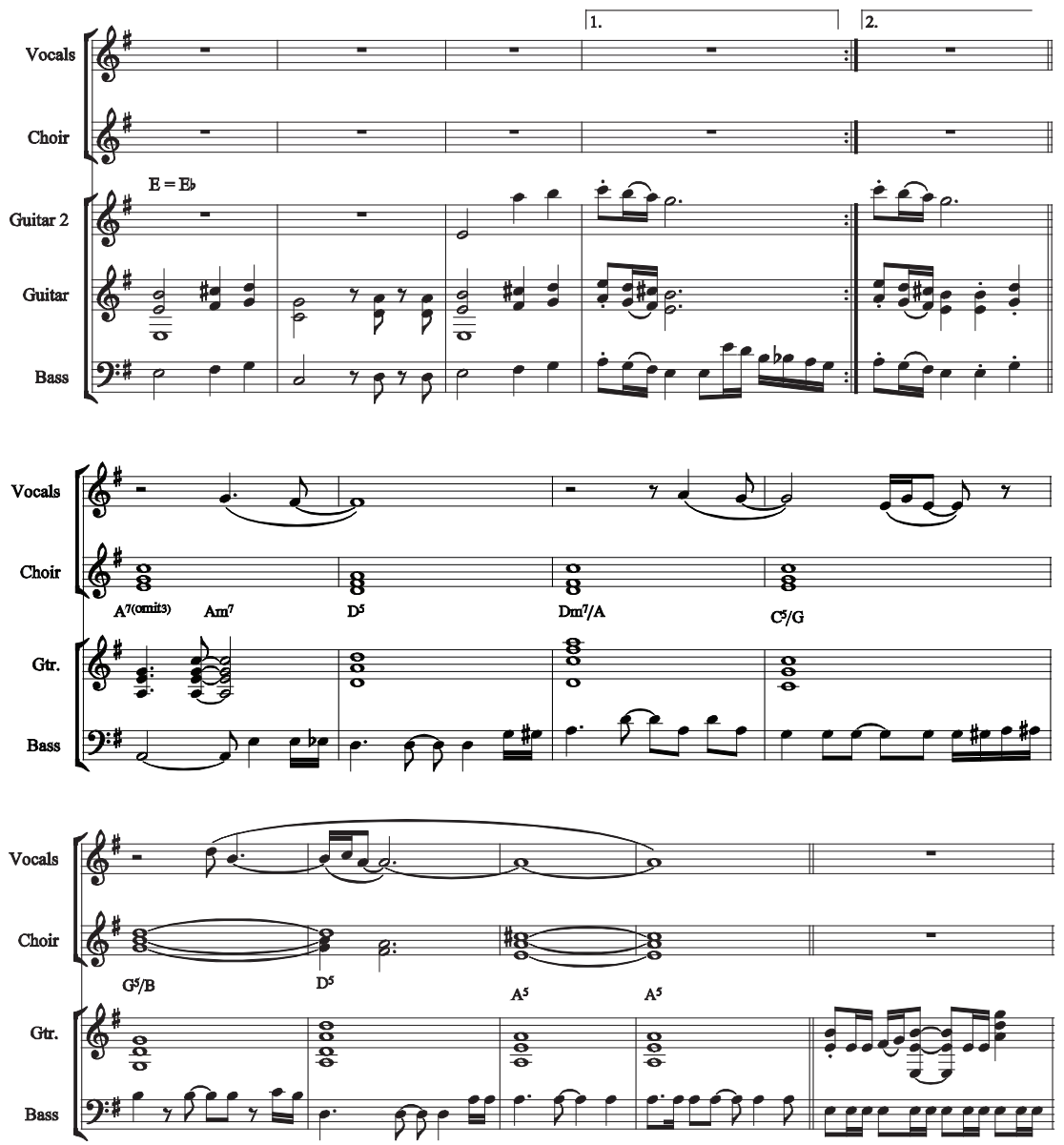
Example 3.37. "Hey Joe".



Example 3.38. Reduction of "Hey Joe".

Level of counterpoint and mixing different voice leading types is further explored in the following example of Black Sabbath's "Heaven and Hell" (*Heaven and Hell* 1980). This composition applies a very similar interplay of different polyphonic techniques as "Hey Joe". The riff in mm. 1–5 works in exact parallel motion (Example 3.39); the second guitar adds parallel thirds to the riff. The thirds, however, are diatonic as they abide by the E-Aeolian mode. In the bridge starting in m. 6, the homophonic vocal choir conforms to the traditional voice leading rules. The main vocal part and the bass show overlapping articulation when compared to the homophonic chords in the guitar and the vocal choir. Furthermore, the bass shows a relatively high level of independence from the guitar chords. Not only it is contrapuntal, but seems to take less care of the chord roots than one might usually expect. In conclusion, for the most part the bridge section is well described as free counterpoint – even if the articulation of different parts in the final cadence (mm. 11–12) co-ordinate in a way that is similar to the contrapuntal practices of the Classical style (as presented by Jan LaRue 1970: 46–47).

Allan Moore (1995: 190) has stated that "inner parts rarely have a linear role, merely existing to fill out the chord". While this may often be the case for parallel guitar chords such as those heard in "Hey Joe" or "Heaven and Hell", it seems to be a somewhat over-generalized view in the light of the examples presented here (also, cf. Wagner 2003: 356n6).



Example 3.39. "Heaven and Hell" (main riff and bridge, ca. [2:00–2:41])

4

Characteristics of Distorted Chords and Their Effects on Harmonic Construction

> The medieval composers down to Sebastian Bach used for their closing chords either exclusively major chords, or doubtful chords without the third (Hermann von Helmholtz [1821–1894] 1954: 217).

There are two distinctive features that are common to all heavy metal music: high volume, and guitar distortion. These elements combined give heavy metal its characteristic sound. High sound pressure levels and, more importantly, distortion have increased during the history of heavy metal (Berger 1999: 58–59; Berger & Fales 2005). Distortion seems to have an especially significant role in the construction of individual chords, in melodic and harmonic procedures, and the ways chords relate to their tonal contexts.

Nonlinear distortion creates both harmonic and intermodulation frequency components (see e.g. Dutilleux & Zölzer 2002; Bloch 1953; Rossing 1990: 447–448). Because of this, the sound of a distorted chord is more complex than the actually played notes would indicate. Distortion effect also compresses the signal causing longer decay-time of tones and lifting the noise floor due to increased gain. Figure 4.1 illustrates how distortion effect alters the guitar sound on a general level. When a guitar string is plucked and processed with distortion effect, two types of distortion is are generated: harmonic distortion and intermodulation distortion. The first of these creates harmonic overtones, while the last creates combination tones (e.g. Rossing 1990: 447).

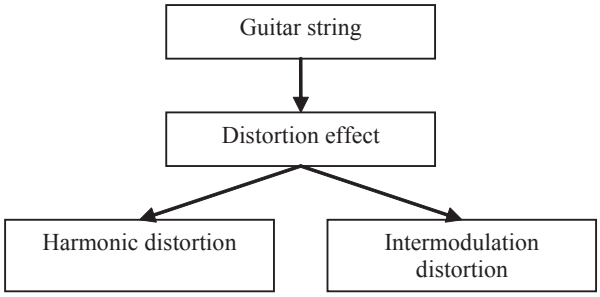


Figure 4.1. Distortion effect alters guitar sound.

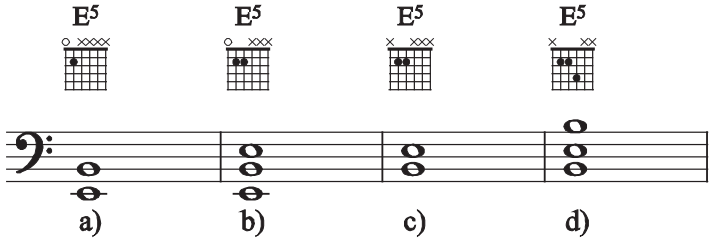
In the last parts of this Chapter, distortion effect is discussed from a musical point of view. It is suggested that distortion is an important reason why some chord structures are more frequently used than others. These structures, namely 1) the power chord, 2) the major triad, and 3) the dominant seventh structure, abide by the lowest harmonics of the root tone and seem to be considered as the most consonant. Moreover, from the point of view of traditional theory of harmony, these chord structures are frequently applied to seemingly odd scale degrees.

4.1. Power Chord

The term "power chord" refers to an interval of the fifth or the fourth with possible octave doublings (see e.g. Berger 1999: 313; Whitehill 1989: 122; Marshall 1997: 124, 127). The power chord is an especially normative musical feature for heavy metal. According to Walser (1993: 2) "the power chord is used by all of the bands that are ever called heavy metal and, until heavy metal's enormous influence on other musical genres in the late 1980s, by comparatively few musicians outside the genre". Pete Townshend of The Who is often credited of being the first one to use power chords extensively for musical purposes (e.g. Walser 1993: 77; 2004b; Murray 2003; McEvoy 2000), although it was used by other bands such as the Kinks in the 1960s. For instance, the Kinks' "You really got me" was built around power chords (Walser 1993: 9).[14] However, the inventor of the term is not known. Music journalists have the probable main responsibility for the term's wide usage nowadays; by the 1980's the term appeared widely in guitarists' magazines in parallel with heavy metal's rise to the popular mainstream (e.g. *Guitar Player*, *Guitar World* and *Guitar for the Practicing Musician* magazines of the 1980's).

14. Dave Davies of The Kinks has emphasized the The Kinks' influence on The Who: "Ray [Davies, the songwriter of The Kinks] has influenced a lot of Townshend's compositions" (Forte 1977: 53).

In chord symbol notation the power chord is usually indicated with a figure "5" (referring to the interval of the fifth) attached to the letter indicating the chord root; for example, E^5 consists of E and B. Power chords have no thirds. Example 4.1 shows an E^5 power chord in four typical fingering positions for guitar – a), b) and c) being the most common. The most basic form consists of a perfect fifth, or that with the root doubled at the octave (Examples 4.1a and 4.1b). Example 4.1c presents the inversion of the first one – for instance, this form is used in the famous riff in Deep Purple's "Smoke on the water" (1972). The last one (Example 4.1d) is the same with its lowest note doubled at the octave – this one is frequently used in more contemporary metal, e.g. Mercyful Fate's "Banshee" (1998), but can be found as early as in Jimi Hendrix's "The wind cries Mary" (1983 [1967]).



Example 4.1. E^5 power chord in typical guitar positions.

Some scholars (e.g. Everett 2000: 330–335) apply the term power chord to any interval of the perfect fifth. The position taken in this study, however, is that an intervallic formation in itself is not enough – the employment of distortion is essential to the formation of a power chord. This will be demonstrated in the following chapters.

Despite its apparently simple structure, the actual sound of the power chord is remarkably complex. According to Walser this is due to the heavy distortion and high volumes. "An effect of both distortion and volume, resultant tones are created by the acoustic combination of two notes" (Walser 1993: 43). However, a recent study has shown that high volumes are not necessary for resultant tones to arise (Penttinen et al. 2009). Instead, harmonic overtones and combination tones created by distortion are essential.

> Distortion […] results in a timbral change toward brightness, toward a more complex waveform, since distorting a signal increases the energy of its higher harmonics. Power chords, on the other hand, produce powerful signals *below* the actual pitches being sent to the amplifier. Thus, the distorted guitar signal is expanded in both directions: the higher harmonics produced by distortion and brilliance and edge (and what guitarists sometimes call "presence") to the

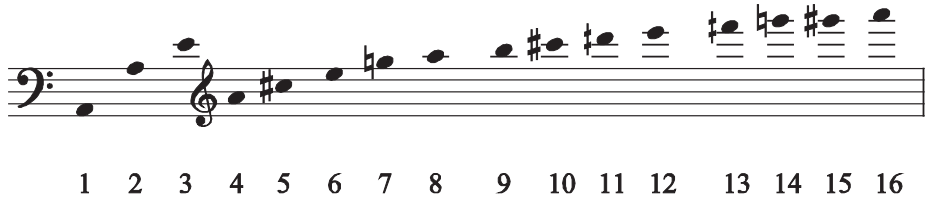
> sound, and the resultant tones produced by the interval combinations of power chords create additional low frequencies, adding weight to the sound. (Walser 1993: 43.)

In the following the influence of distortion is discussed further to give a more detailed picture of the complexity of the matter.

4.2. Harmonic Overtones and Combination Tones

4.2.1. Harmonic Overtones

A musical tone consists not only of the fundamental frequency after which it is named. Every tone consists of harmonic partials, or overtones, the frequencies of which are multiples of the fundamental frequency (i.e. the first harmonic). "The note *A* sung by a bass, for example, will contain components with frequencies 110, 220, 330, 440, 550, 660 Hz etc." (Lindley et al. 2003.) This concept is known as the harmonic series. "The pitch associated with the harmonic series is that of the fundamental or first harmonic" (Oldham et al. 2003). For example, the first sixteen partials of an open guitar string A (110 Hz in standard tuning) are shown in Example 4.2. All the examples in this Chapter hereafter are in proportion to *A* (110 Hz).



Example 4.2. The first 16 partials of the harmonic series of A (110 Hz) in their approximate notational equivalents. The frequency of a harmonic is 110 Hz multiplied by its number.

In theory, the number of harmonic partials is infinite. Usually, however, the partials gradually weaken in ascending order – the higher numbered a harmonic the weaker the sound (Pierce 1999b: 277). In other words, since the lowest harmonics are closest to the fundamental, they form, in general, the most audible tones (this is evident in diagrams that depict non-distorted guitar sounds; furthermore, this is why the following discussion is much concentrated on relatively low partials). It is known that different instruments emphasize harmonic partials differently – alongside with other acoustic features such as the effect of sound pressure level on the sound spectra (see e.g. Pierce 1999a:

65–66; Rossing 1990: 190, 230–231, 270). Also the position at which a string is plucked has been shown to have an effect on which partials are more and which less prevalent in the sound spectrum (Rossing 1990: 189–190). Furthermore, psychoacoustic studies have shown that not all harmonics that are heard are simply physical in nature, and furthermore, that the human ear can compensate especially the low-level sounds (Mathews 1999: 9).

It has been suggested that different types of distortion effects and amplifiers give rise to different harmonics. For example, power amplifiers usually emphasize odd-numbered harmonics while pre-amplifiers treat all harmonics as somewhat equal (e.g. Lassfolk 1996). However, the following discussion is concentrated on general differences between distorted and non-distorted guitar sound. Thus, the type of distortion is not an issue here.

Empirical measurements have been conducted for this study to clarify the complexity of distorted guitar sound. All the following diagrams depicting magnitude responses (i.e. spectra) of distorted and non-distorted tones, intervals, and chords are produced with *Matlab* software by Dr. Henri Penttinen and used here with kind permission. The measurements were conducted at the Helsinki University of Technology, Department of Signal Processing and Acoustics, where digitally modeled distortions (Karjalainen et al. 2006) and commercially available digitally modeled guitar effects (Adobe Systems Incorporated 2008) were used (for further details, see Penttinen et al. 2009: 156–157). Figure 4.2a shows the first nine harmonic partials of *A* (110 Hz) without distortion. As expected, the magnitude of the partials gradually decreases by their number: the fundamental harmonic (110 Hz), the octave (220 Hz), the fifth (330 Hz), and the double octave (440 Hz) are clearly the most prevailing. When the same tone is played with a distortion effect, the result is (due to harmonic distortion) a significant amplification in higher partials (Figure 4.2b).

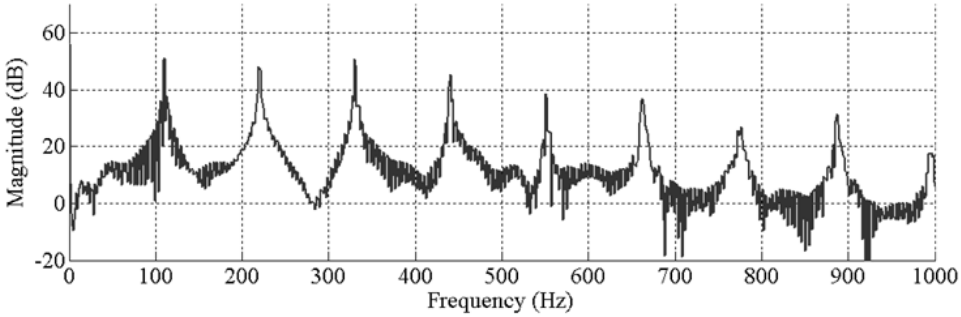


Figure 4.2a. Spectrum of non-distorted guitar tone (110 Hz).

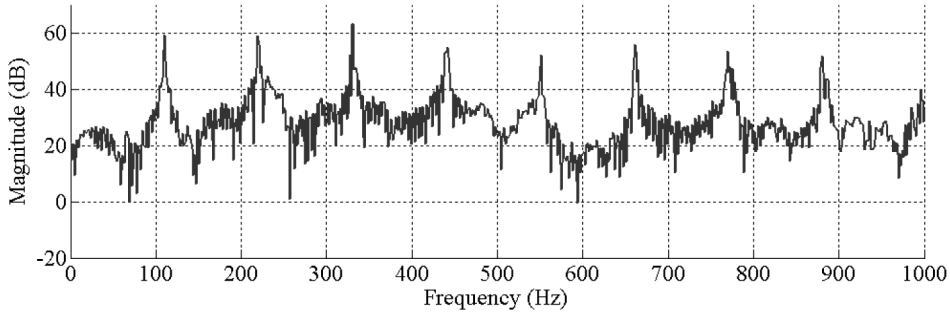


Figure 4.2b. Spectrum of distorted guitar tone (110 Hz).

Another difference between distorted and non-distorted guitar sound is a question of inharmonicity. Early theorists (e.g. Pythagoras, Zarlino, Rameau), who based their theories on vibrating strings, were not aware that a stretched metallic string is never exactly harmonic, but inharmonic instead (e.g. Rossing 1990: 291–292). In an ideal situation, a string would vibrate in exact proportions of a harmonic series.

> For a uniform, completely flexible string, the mode frequencies (or resonance frequencies [harmonic partials]) are members of the harmonic series represented by the following formula, in which n is the harmonic number (counting the fundamental as the first harmonic) and F is the fundamental frequency: frequency of n^{th} harmonic = nF (Campbell 2006).

However, when the string is stretched it will not anymore vibrate in equal fractions. Usually this inharmonicity has a clearer effect on higher partials (Rossing 1990: 291–292). For example, a bass string on a piano may have inharmonic components that

> increase the frequency of the twentieth mode [i.e. harmonic partial] by nearly 8% (a sharpening of more than a semitone) […]. Since the frequency spectrum of the sound radiated by a plucked or hammered string consists of the inharmonic natural mode frequencies of the string, the degree of inharmonicity can have significant effect on the perceived timbre of the sound. (Campbell 2006; cf. Rossing 1990: 291)

This has been proven to have a considerable effect, for example, on how the piano is tuned – with stretched rather than pure octaves (Rossing 1990: 292; Lindley et al. 2003). The same effect can be noted in the case of the guitar. Figure 4.3 shows harmonic and inharmonic components of a guitar string that is played with and without distortion. The diagram is a zoom-in into relatively high frequency partials, since the difference between harmonic and inharmon-

ic components is then very clear. Solid vertical lines indicate the positions of harmonic distortion partials that are integer multiples (*i*) of the fundamental frequency; dashed vertical lines display the frequency components of the string vibrations that are inharmonic. Inharmonic string partials fall in between the harmonic distortion components. This is a consequence of the aforementioned fact that all strings with a little finite flexibility are inharmonic, while the frequency components caused by distortion are exactly harmonic.

Another result may be read from Figure 4.3. Since the magnitude of the distorted signal is about 20 dB higher that the non-distorted one, harmonic distortion partials seem to override inharmonic string partials. Although this has to be subjected to further study, it may be said that the distortion effect makes the electric guitar sound more harmonic.

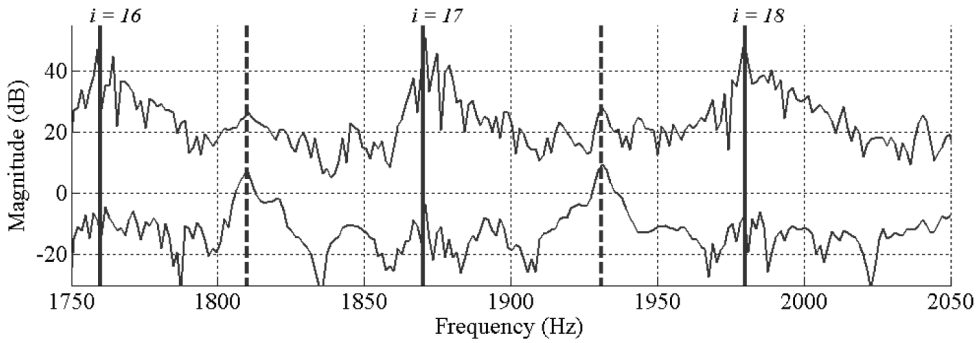
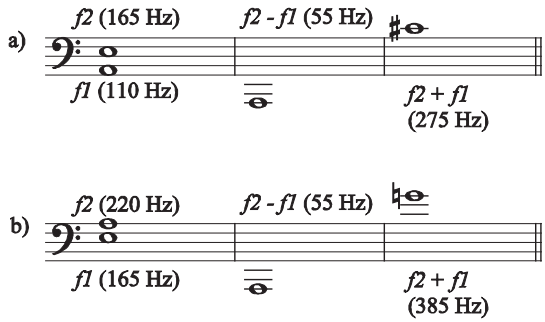


Figure 4.3. Guitar tone A (110 Hz) with distortion (top line) and without distortion (bottom line).

4.2.2. Combination tones

A combination tone is "[a] sound that may be heard when two loud musical tones are sounded together but is not present when either of the tones is sounded separately" (Greated 2003b). In 1754 *Trattato di musica secondo la vera scienza dell'armonia* Giuseppe Tartini "regards his discovery of combination tones as a confirmation of the overtone phenomena used by Rameau" (Mickelsen 1977: 10). The credit of discovery before has also been given to Georg Sondre (e.g. Bell et al. 2003). However, the first convincing evidence of their existence was not presented before Hermann von Helmholtz (1954: 152–159) in the mid nineteenth century. Hugo Riemann seems to have confused a type of combination tone (namely, the difference tone) with the so-called "undertone". Riemann saw undertones as conceptual parallels to overtones, and founded much of his theory on this misconception (e.g. Mickelsen 1977: 11).

In theory, the simplest (first order) combination tones of the frequencies f_1 and f_2 are given by their subtraction ($f_2 - f_1$, the difference tone, which is sometimes called the "Tartini tone" [Greated 2003c]) and multiplication ($f_1 + f_2$, i.e. the summation tone) (e.g. Rossing 1990: 151, 153, Benade 1976: 256–257). As shown in Example 4.3a, the frequencies of 110 Hz (f_1) and 165 Hz (f_2) (*A* and *e* in just intonation; Lindley 2003) give combination tones with frequencies 55 Hz ($f_2 - f_1$) and 275 Hz ($f_1 + f_2$) (*A'* and *c*♯*'*, respectively). In Example 4.3b, these calculations are applied to the perfect fourth *e*-*a* (165 Hz and 220 Hz) that give frequencies 55 Hz (the difference tone) and 385 Hz (the summation tone). As Walser (1993: 43) has pointed out, these difference tones are actually below the register of a standard guitar tuning.



Example 4.3. The first order difference and summation tones of the fifth ***A-e*** *(a) and the fourth* ***e-a*** *(b).*

It has been noted that summation tones may not be heard at all, because they overlap with initial harmonics and are masked by them (Rossing 1990: 154–155); this mistake was probably made by Helmholtz (1954: 153). Since the difference tones are clearly separable from the initial harmonics, the discussion here is mainly focused on them.

According to Clive Greated (2003c) "[d]ifference tones are most frequently audible in a musical context when two instruments, e.g. flutes, are played together in the high register". In contrast to this, and following musical practises of heavy metal, the examples here are in relatively low registers. Still, the difference tones are audible and, as will be shown, acoustic reality. Furthermore, the difference tone is sometimes confused with the so-called "residue tone", which is generated

> when a group of harmonically related pure tones is sounded quietly together. […] It can be distinguished from the difference tone because if all the components are raised in frequency by the same amount, the residue tone also rises, though not by the same amount. (Campbell 2003.)

Since musical tones in heavy metal are generally produced in high volumes, there should be no danger of confusing difference tones with residue tones. The former is with no doubt more important to the sound of heavy metal.

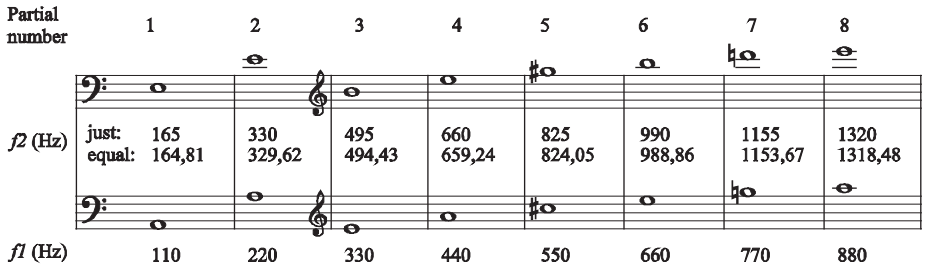
It has often been suggested that combination tones are subjective rather than acoustic, a line of argument that is of special interest here. This position is reflected in the following quotations:

> [Combination tones] are usually attributed to non-linearities in the system through which the sound is being transmitted or reproduced. If the only system involved is the ear, they are sometimes described as 'subjective tones.' (Greated 2003b.)

> Combination tones are subjective tones that reside entirely within the perception of listeners; they are commonly thought to originate in the cochlea and/or in the central nervous system (Green & Butler 2002: 255).

This view is well supported in current musicology. A recent study on heavy metal guitar sound reflects this: "Resultant tones are a perceptual – rather than acoustic – feature that would not be depicted in the spectrograms of the guitar samples" (Berger & Fales 2005: 194). This argument is questioned below. One of the most important findings of this study is that combination tones are an acoustic fact.

In theory, combination tones are created not only by the fundamentals but also by higher harmonic partials (e.g. Benade 1976: 256). These higher order combination tones result in, for example, frequencies $2f_1$-f_2, $2f_2$-f_1, $2f_2$–$2f_1$, etc. Example 4.4 shows *A* (= f_1) and *e* (= f_2) with their first eight harmonics (1*f* – 8*f*). Some partials match perfectly (when justly intoned), and thus intensify each other (e.g. $3f_1$ and $2f_2$, $6f_1$ and $4f_2$). Other combination tones of the fifth *A*-*e* are given in Table 4.1. The arithmetic operations can be continued indefinitely. On these few, however, a clear emphasis on the original harmonics of *A* can be detected.



Example 4.4. The first eight harmonic partials of A and e. Equally tempered fundamental frequency for e is adopted from DPA Microphones (2008).[15]

In musical practice intervals are hardly ever justly intoned. If guitar tuning is considered, the real situation is somewhere in between the justly and equally tempered tuning, and dependent on each individual case (e.g. chord, positioning and voicing, overall tuning, the place where the string is plucked, etc.). Sometimes the interval in question will be closer to one or the other. For example, if the fifth was precisely equal tempered, the difference tone $2f_2$-f_1 (219,62 Hz) would be 0,38 Hz lower than $2f_1$ (220 Hz). This difference results in acoustic beating between the two tones. However, the difference between the two is very small and takes place only once in about every three seconds (i.e. 0,38 times per second). Thus, the effect is hardly noticeable (cf. Moore 2003). Furthermore, the difference of this magnitude (as in all the other cases in Table 4.1) falls within the range of the so-called "just noticeable difference of frequency" (e.g. Karjalainen 2000: 96, 109–111). This means that, for example, difference tone $2f_2$-f_1 resulting from a justly intoned interval is audibly inseparable from its equal tempered counterpart. In other words, a tuning system is not relevant for the perception of these tones.

15. In the *Pro Audio Dictionary* (DPA Microphones 2008) the frequency of G♯' is erroneously reported as 56 Hz, while it should be 52 Hz.

Combination tone	Just intonation (Hz)	Equal tempered (Hz)	Notation
f_2-f_1	55	54,81	*A'*
$2f_1$-f_2	55	55,19	*A'*
$2f_2$-f_1	220	219,62	*a*
$2f_2$–$2f_1$	110	109,62	*A*
$3f_1$-f_2	165	165,19	*e*
$3f_1$–$2f_2$	0	0,38	-
$3f_2$–$3f_1$	165	164,47	*e*
$3f_2$–$2f_1$	275	274,47	$c^{\sharp}$'
$3f_2$- f_1	385	384,47	*g'*
$3f_2$–$4f_1$	55	54,47	*A'*
f_1+f_2	275	274,81	$c^{\sharp}$'
$2f_1$+f_2	385	384,81	*g'*
$2f_1$+$2f_2$	550	549,62	$c^{\sharp}$"
$3f_1$+$2f_2$	660	659,62	*e"*

Table 4.1. Some combination tones of A (f_1) and e (f_2). The resulting frequencies are in both justly tempered and equal-tempered system.

Helmholtz (1954: 155) was not able to prove that higher order difference tones exist. Their existence has now been proven, but they are still said to be hard to detect (see Rossing 1990: 151–152). Distortion effect changes this dramatically. Acoustic measurement of the *A*-*e* power chord shows the objective nature of combination tones (Figure 4.4). When the dyad *A*-*e* is played without distortion, the most audible components are, as expected, the multiples of the original pitches (i.e. 110 Hz, 165 Hz, 220 Hz, 330 Hz, and 440 Hz). When the harmonic partials coincide, there is a stronger magnitude peak. Due to intermodulation distortion, the power chord has harmonic partials that do not exist without distortion. For instance, a difference tone around 55 Hz (distortion component d_1) is clearly present as suggested in Example 4.3a. Furthermore, there are magnitude peaks around the major third (275 Hz) and the natural minor seventh (385 Hz) (d_2 and d_3, respectively). They are summation tones of the original pitches ($f_1 + f_2$ = 110 Hz + 165 Hz = 275 Hz ≈ $c^{\sharp}$' and $2f_1 + f_2$ = 220

Hz + 165 Hz = 385 Hz ≈ *g*'), but also higher order difference tones (e.g. $4f_1 - f_2$ = 440 Hz – 165 Hz = 275 Hz and $5f_1 - f_2$ = 550 Hz – 165 Hz = 385 Hz).

Since the sound pressure level was not a factor in these measurements, this example also questions the relevance of high sound pressure level, thus contradicting earlier studies (e.g. Walser 1993: 43). As it is shown here, the distortion alone is enough, high volumes are not necessary for the production of combination tones.

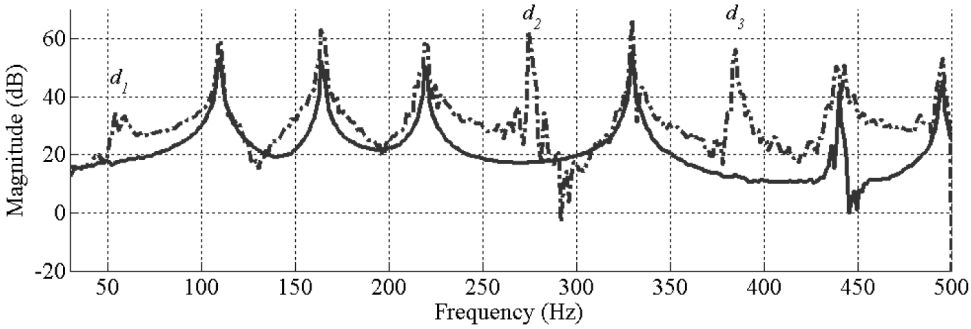


Figure 4.4. A-e (110 Hz and 165 Hz) without distortion (solid line) and with distortion (dashed line).

Harmonics of the power chord operate as shown in Figure 4.5; notational equivalents are presented in Example 4.5. The root tone and the fifth generate harmonic components of their own. The sounding together of the two generates harmonics that are those of a new fundamental frequency lying one octave below the original root. This has been called a "distortion fundamental" (Pentinen et al. 2009).

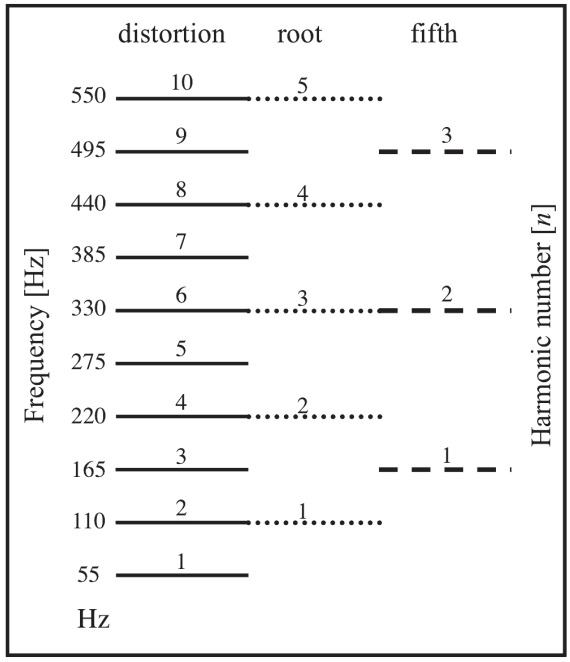
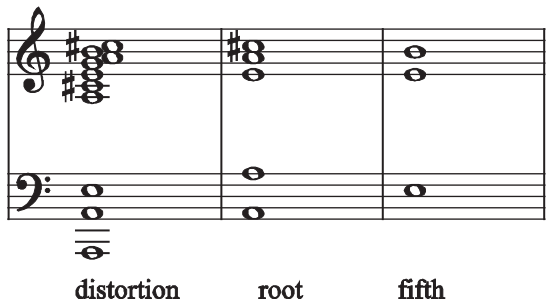


Figure 4.5. Harmonics of the power chord A-e (110 Hz and 165 Hz, respectively). The harmonics of the distortion partials (solid line), the root (dotted line), and the higher interval (dashed line) are shown as a function of frequency and a harmonic number (Penttinen et al. 2009: 156).



Example 4.5. Notational representation of Figure 4.5.

Some distortion components are of special interest. First of all the distortion fundamental may be regarded as a chord root, rather than the chord root that is actually played. Furthermore, all the higher partials belong to the same harmonic series, which is not the case with, for example, the minor triad. This is why the power chord is here regarded as the most consonant chord structure.

Furthermore, the strong occurrence of C♯ means that the major third is present even though it is not actually played. The same goes for the G, the minor seventh. There is also evidence that guitar players are aware and make use of this "virtual" major third. For example, Pete Townshend states:

> None of the shapes [chords] that I play with loud distortion have a 3rd, because you hear the 3rd in the distortion. [… With a power chord] you're getting the second- and third-harmonic distortion, so the first note you're hearing is the 3rd [harmonic], the second note you're hearing is the 4th [harmonic], and the last note you're hearing is the 5th [harmonic], so if you *played* the 3rd, you're going to get a note which is 4th [harmonic] up from *that* […]. That sound I can't stand is people playing a complete *C* chord with fuzz. They're actually getting something like a *C13*. (Resnicoff 1989: 80.)

It is thus evident that musicians also hear the sound of a power chord as richer and more complicated than just a plain fifth.[16]

4.3. Major and Minor Triads

The rejection of employing thirds with distortion that many guitar players seem to share can be clarified further by exploring the constituents of major and minor triads. It appears that distorted triads have more dissonant qualities than power chords. This might explain why the power chord is the most frequent chord structure in heavily distorted music.

Frequently triads are played with the root omitted. This was also the case for the spectral analysis; in this way the diagrams are easier to understand, since there are fewer partials. Figure 4.6 shows the spectrum of an A major triad consisting of tones *e* (~165 Hz), *a* (~220 Hz) and *c♯'* (~275 Hz). Without distortion the resulting intermodulation components are in accordance with the harmonic partials of the original tones; there are octave doublings (e.g. those resulting from the components of E: 330 Hz, 660 Hz; 990 Hz; of A: 440 Hz, 880 Hz; and of C♯: 550 Hz) and fifths in several octaves (e.g. E: 495 Hz; A: 330 Hz, 660 Hz; 990 Hz; and C♯: 825 Hz). As before, when the distortion is applied, many more partials are created. The majority of combination tones (intermodulation components) appear between the original chord tones. One obvious result is, again, the appearance of harmonic series of *A* (55 Hz), but also that of E (165 Hz).

16. The Who's Live at Leeds (1970) provides excellent examples of Townshend's guitar style.

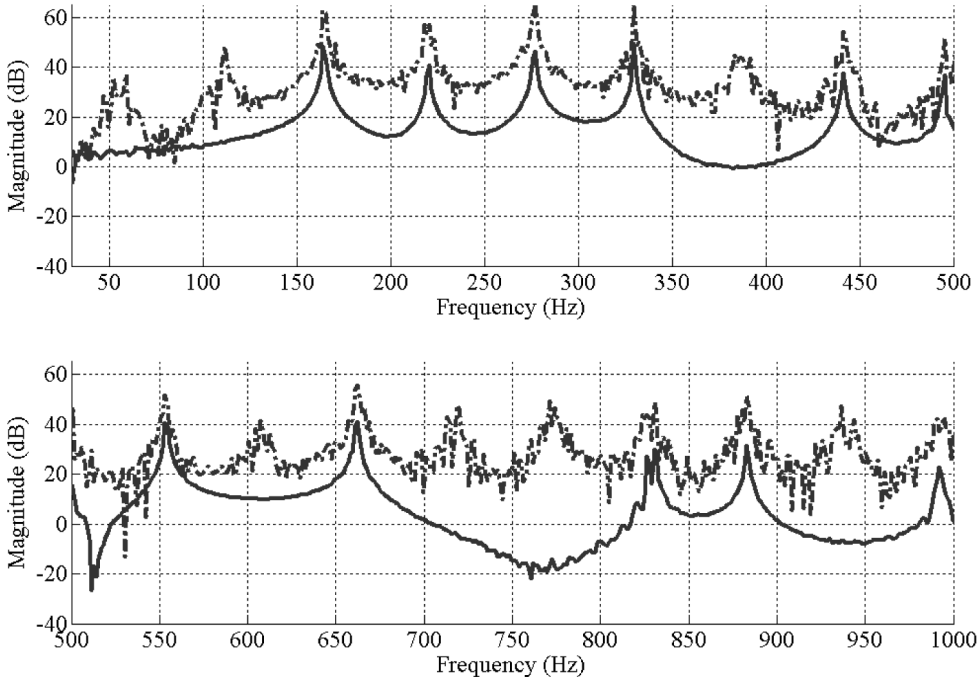
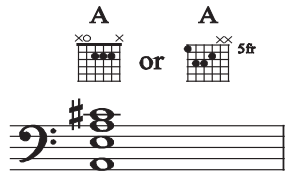
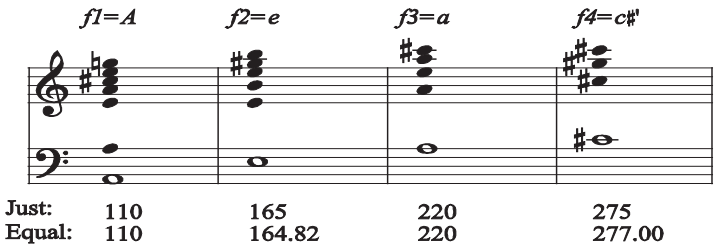


Figure 4.6. Spectrum of A major triad e-a-c♯' without distortion (solid line) and with distortion (dashed line).

Example 4.6 shows an A major triad in another typical guitar voicing, and Example 4.7 some harmonic partials it produces.



Example 4.6. A major triad.



Example 4.7. Some harmonic partials of the A major triad. The fundamental tones are presented with open, and their higher partials with full note heads.

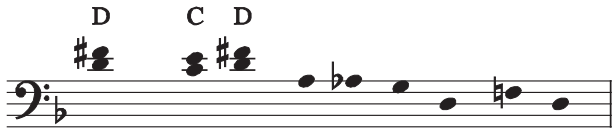
Applying mathematics to this case, the four fundamental tones and their harmonics appear as follows. If the chord consisted of justly tempered intervals the combination tones would be equal to the harmonic partials of the fundamental tones. In that case, a noticeable dissonance could be detected between harmonics in the area of $7f_1$ (770 Hz ≈ *g"*), $5f_2$, and $3f_4$ (both 825 Hz ≈ $g^{\sharp}$"), and $4f_3$ (880 Hz = *a"*). This cluster of three minor seconds represents a high level of dissonance.

As already noted, guitar tuning is neither just nor equally tempered. However, it seems helpful to present an equal tempered case as an opposite to just tuning. Harmonics created by a distorted justly tempered triad can create a noticeable dissonant effect, but equal tempered triad gives even more complex results. For instance, all the multiples of f_4 cause beating with other partials such as happens around $c^{\sharp}$' and $c^{\sharp}$". As shown in Table 4.2, there are several harmonic components with different frequencies around various occurrences of C$^{\sharp}$. For instance, the fifth harmonic of f_1 ($5f_1$ = 550 Hz) and the second harmonic of f_4 ($2f_4$ = 554 Hz) are both around $c^{\sharp}$". They cause acoustic beating of 4 beats per second. Clashes of some harmonics and combination tones from Example 4.7 can be found in the following table. Although these fall in the range of just-noticeable difference of frequency, when sounding together, they may be heard as being slightly out of tune.

Notation	Component 1	Component 2	Beats per second
$c^{\sharp}$"	$5f_1$ = 550 Hz	$2f_4$ = 554 Hz	4,00
$c^{\sharp}$"'	$5f_3$ = 1100 Hz (= $10f_1$)	$4f_4$ = 1108 Hz	8,00
$c^{\sharp}$'	$3f_2 - 2f_1$ = 274,46 Hz	f_4 = 277 Hz	2,54
$c^{\sharp}$'	$f_1 + f_2$ = 274,82 Hz	f_4 = 277 Hz	2,18

Table 4.2. Some beating components in A major triad.

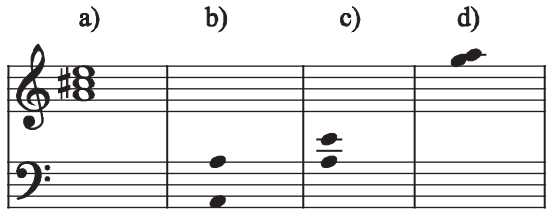
In conclusion, the equal-tempered major third C♯ played on the guitar is not the same as the C♯ formed by distortion. This probably is the reason why most heavy metal guitarists reject triads – the third is considered to be unpleasantly out of tune. The major triad has been applied in earlier heavy metal and in blues-rock, especially when the distortion has been milder. For instance, Cream's "White Room" is mainly built on major triads. Also the riff in Cream's "Sunshine of your love" (*Wheels of Fire* 1968) contains a sequence of altering D major and C major triads, although with omitted fifths (Example 4.8). Distortion used by, for example, Eric Clapton of Cream in the late sixties was somewhat milder than that used by, for instance, NWOEHM bands in the eighties. If the distortion is milder, the intermodulation components are not emphasized to such a strong degree. Thus, combination tones are not generated in sufficient quantities to cause them to clash too much with the original third that is actually played. Anyhow, aural analysis may reveal some amount of roughness in the sound.



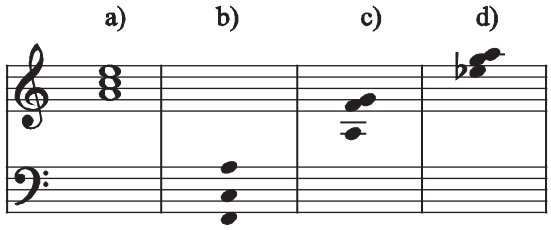
Example 4.8. Reduction of the riff to "Sunshine of your love".

The minor triad is even more rarely used in heavy metal. It is suggested here that when the signal is distorted, the roughness of the minor triad is remarkably higher than in, for example, the power chord or the major triad. Helmholtz argued that while combination tones of the major triad support the harmonic series of the root, the case is quite different with the minor triad (Examples 4.9 and 4.10). "For the minor triad […] the combinational tones of the first order [Ex. 4.10b], which are easily audible, begin to disturb the harmonious effect" (Helmholtz 1954: 216).

As shown in Example 4.10, an A minor triad creates combination tones that support the harmonic series of F, and not that of A. This was a clear sign for Helmholtz to regard the minor system as inferior to the major system. "The minor triad is very decidedly less harmonious than the major triad, in consequence of the combinational tones, which must consequently be here taken into consideration" (Helmholtz 1954: 216). Ottokar Hostinský in the late nineteenth century suggested that the minor triad is a structure, which is based on three sources. For instance, in the A minor triad the fifth (A-E) creates the harmonic series of A, the major third (C-E) the overtones of C, and the minor third (A-C) those of F (Tolonen 1969: 40).



Example 4.9. A major triad; the fundamental tones (a), their difference tones (b), the second order difference tones (c), and third order difference tones (d) (after Helmholtz 1954: 215).



Example 4.10. A minor triad; the fundamental tones (a), their difference tones (b), the second order difference tones (c), and third order difference tones (d) (after Helmholtz 1954: 215).

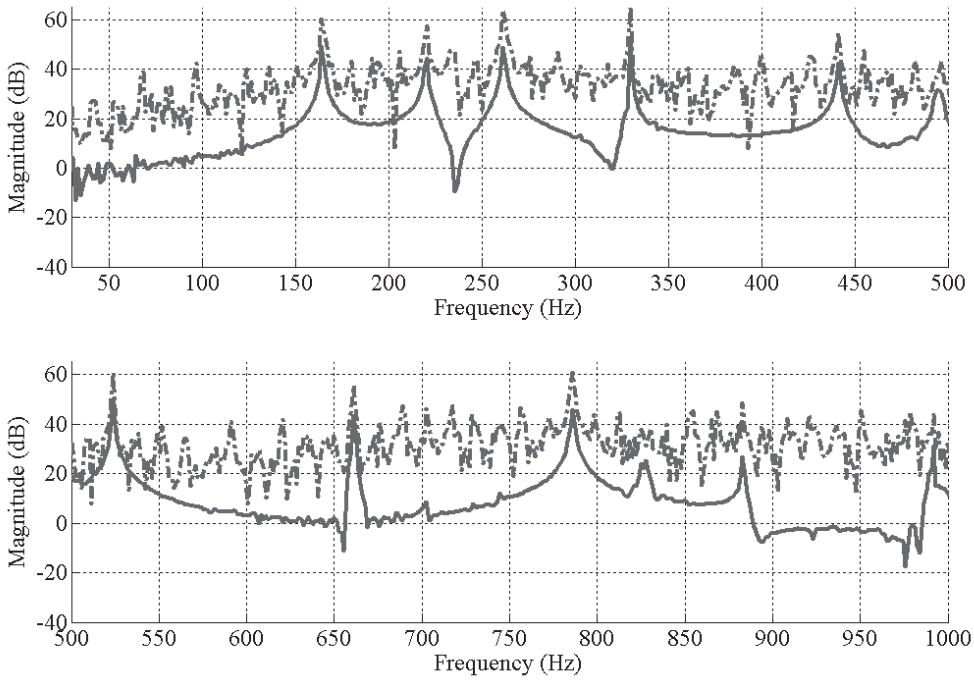
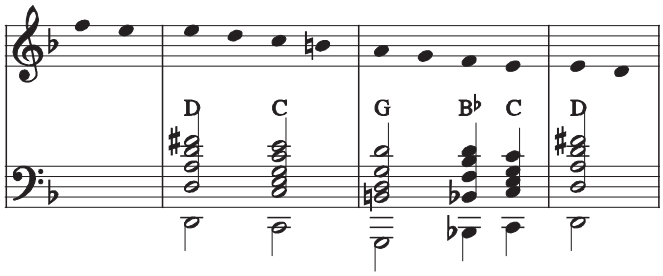


Figure 4.7. Spectrum of A minor triad triad e-a-c' without distortion (solid line) and with distortion (dashed line).

Spectrum of a non-distorted A minor triad does not show components of F, but clearly shows components of A and C (Figure 4.7). When distorted, however, there appears a vast number of combinational tones that belong to harmonic series of A, C, and F. In other words, intermodulation distortion raises multiple harmonic series. This seems to be in accordance with Hostinsky's theory, although these series are not detected without distortion. For example, the fifth *e* (165 Hz) and the octave *a* (220 Hz) of the chord root follow the harmonic series of *A'* (55 Hz), whereas the minor third *a'-c"* belongs to harmonic series of *F* (45 Hz). The *G* (around 50 Hz) in the same region is a resultant tone of the major third *c'-e'* (the *c'* as the fundamental harmonic and *e'* as the second harmonic of the *e*).

The result is somewhat fuzzy – this can be perceived visually as well as aurally. For instance, the low-frequency intermodulation components clash with each other in a musical sense, thus making the chord root aurally hard to detect. In other words, the distortion fundamental of a minor triad is far less clear than that of a power chord or a major triad. It seems evident that since the minor triad has significantly more roughness than any of the other structures discussed here, its use in heavily distorted guitar music is rare.

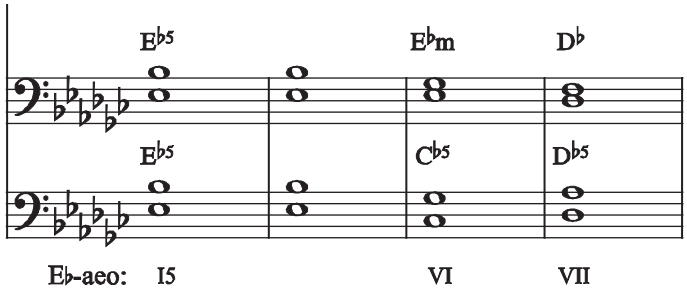
Most probably for the same reason, major triads have been used instead of minor triads, even though they might be seemingly out of key. Cream's "White Room" (*Wheels of Fire* 1968) presents an example on this (Example 4.11). Chord roots and vocal melody are built around D-Dorian, but the chord on the first degree is a major triad as well as all the others.



Example 4.11. Verse of "White room".

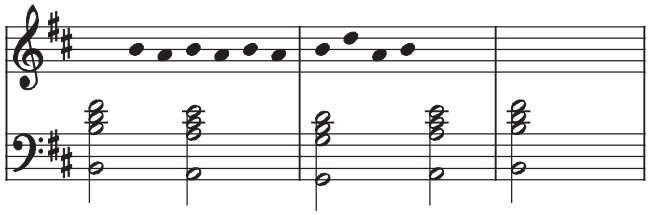
The favouring of the major instead of the minor triad may be explained in a similar manner to the power chord. Even if the blues-rock guitarists of the late sixties used a lesser degree of distortion, they used enough to make the minor third appear very rough. At least when the guitar chords are in question, these findings support views of earlier theorists who thought the major as the "natural" system and minor as "inferior" or, anyhow, "artificial" (cf. Helmholtz 1954: 215–217; Schoenberg 1978: 95; Schenker 1954: 21–29, 52).

Minor triads are often also avoided for problematic scale degrees by using power chords, even if the chords on other scale degrees are triads. In Black Sabbath's "Die Young" (*Heaven and Hell* 1980), two guitar parts form major triads on the Aeolian VI and VII degree (Example 4.12). The first degree (which in that mode should be a minor triad) is a power chord. The reason is probably that the minor triad is too rough to act as the tonic degree.



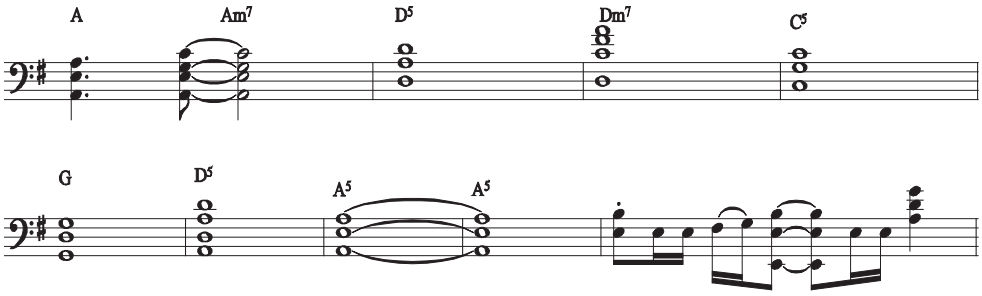
Example 4.12. The two guitar parts of "Die Young" ("outro" section).

Minor triads are used on occasion, but usually when the distortion is relatively mild. This is the case in Jimi Hendrix's "All Along the Watchtower" (1968) (Example 4.13).



Example 4.13. Excerpt of Jimi Hendrix: "All Along the Watchtower".

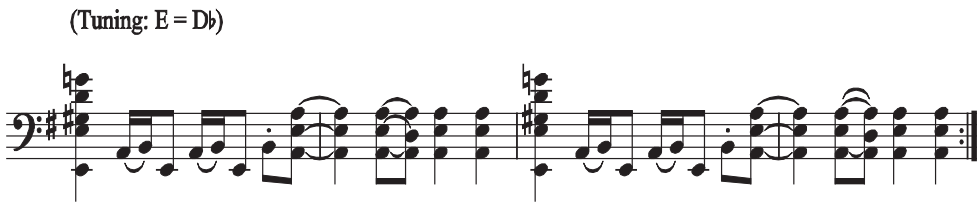
With substantial distortion the minor third may be used to produce the effect of fuzziness. For instance, in Black Sabbath's "Heaven and Hell" (*Heaven and Hell* 1980), there are two minor seventh chords in the bridge section (Example 4.14). These chords have much more rough sound if compared to the power chords surrounding them. In cases like this, the chord with minor quality gives an incidental dissonant flavour to the composition.



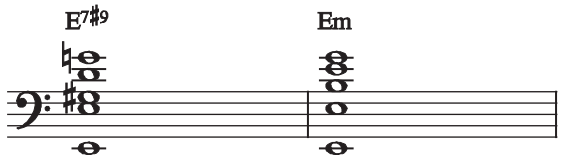
Example 4.14. Guitar part of "Heaven and Hell" (bridge).

To place a very rough-sounding (i.e. dissonant) chord structure on the tonic degree is rarely done. Black Sabbath's "Supernaut" (*Vol 4.* 1972) gives an excellent example of this (Example 4.15 and 4.16). Actually, this resembles a technique of jazz arrangers, who place the most dissonant structures at the most important points in the compositional structure (see e.g. Wright 1982). Furthermore, "Supernaut" is a particularly interesting case with regard to overtone structures in chord construction and aural chord detection. The chord on the first down-beat is either an E minor or an E7♯9, but aurally it is nearly impossible to tell the difference. Googled tablatures show the confusion amongst listeners – sometimes it is even heard as a power chord. In the light of

the discussion above, it should be noted that E minor and E7♯9 produce similar harmonics. Both structures include a minor third, and due to distortion have a major third and a minor seventh.



Example 4.15. "Supernaut". Riff to verse.



Example 4.16. E7♯9 or Em?

Asking the guitarist is probably the only way to be sure which one he used (assuming, of course, that he remembers correctly and/or wants to share the information). However, the point of this study is to explore heavy metal music as it appears to the ear, and not what musicians would like us to think.

4.4. Chord Root and Inversion

According to *Grove Music Online* "[i]n functional harmony the [r]oot of a chord is the note on which it seems to be built" ("Chord" 2006). This leads to a discussion of how chordal inversions relate to heavy metal. Tagg (2003a: 523) suggests that "in most forms of popular music, the lowest note is also usually its root". The issue here is how the concept of the chord root relates to the lowest sounding note. In the harmonic practices of heavy metal the chord root and the bass note may usually be considered to be the same. This apparently trivial question is important, because since Rameau's *Traité* it has been a common practise to perceive harmony in terms of chord inversions. However, in heavy metal, as in most forms of popular music, chord inversions do not play that significant a role. Furthermore, in some ways heavy metal harmony and chord construction seem to be related to the intervallic practices of Renaissance polyphony.

4.4.1. Chord Inversion versus Intervallic Construction

Rameau (1971: 52–53) says that "there are only two chords in harmony: the perfect chord [i.e. major or minor triad] and the seventh [a triad with added minor seventh]". These chords have their source in simple ratios of a divided string. Other structures are derived from these by inversion. In other words, chord structures with seemingly different intervallic construction are generated from the two by means of octave displacement.

> Harmonic division […] produces as harmonic means only the fifth and the two thirds. The fourth and other intervals are also found, but only by means of the octave. All perceptible differences in harmony arise from this fifth and these thirds, so that the arbitrary mingling of sounds which harmony presents to us…should not make us lose sight of a source which is always present. The fifth and the thirds not only divide all the principal chords but also create them […] (Rameau 1971: 35.)

In Rameau's thought, chords (*perfect* and *seventh*) were generated by a fundamental sound (or the "source") by which he means the natural harmonics found by division of a string. Inversions are generated by this "source". The first inversion (6/3 chord) is generated by doubling the ratio of the chord root; the second inversion (6/4 chord) by doubling also the ratio of the third (Rameau 1971: 40–42). For instance, E-G-C (intervals of the third and the fourth) is an inversion of a perfect chord C-E-G. In this view the inversion does not affect the detection of the chord root – it is C in both cases. This theoretical innovation was important to harmonic thinking because now the E-G-C belonged to the "family" of chords based on C, when before Rameau it would have belonged to structures based on E.

In earlier theories structures other than the "perfect chord" were regarded as generated from different source, namely intervals and their relations. For Zarlino E-G-C would have been a modification of E-G-B with its sixth substituted for fifth (e.g. Lester 2002: 754). Following this line of thinking, the E could be called the "chord root" for both of these structures This view can be seen in Zarlino's statement that "musicians often write the sixth in place of the fifth, and this is fine" (Zarlino 1968: 188). Rameau's new concept was quite practical for the theory of music because the vast number of different chord classes were diminished to a much lesser number.

The concept of chordal inversion was alien to many of Rameau's contemporaries; some seem to follow the earlier way of thinking. For instance, in *Gradus ad Parnassum* published in 1725, Johann Joseph Fux (1660–1741) clearly follows Zarlino's concepts: "often the necessity of avoiding the succession of perfect consonances demands the giving up of the triad and the use of a sixth

instead of the fifth, or an octave; or both of them" (Fux 1971: 72). Furthermore, for Fux the term "triad" is reserved solely for what Rameau would have called the "perfect chord" (Fux also applies the term "harmonic triad" for this), and he gives no indication of recognising the concept of inversions (see Fux 1971: 71–72). Joel Lester (2002: 755) appears to have understood this differently, arguing that Fux "explained the inversional relationships between these forms of the triad". Contrary to this view, Ian Bent (2002: 570) says that Fux's use of "6/3 or 8/3 chord in place of a 5/3 constitutes 'a triad abandoned'" – thus placing these structures in a completely different category in Fux's thought.

A related issue to Rameau's theory of inversions was his classification of chords by their *fundamental bass*. Rameau

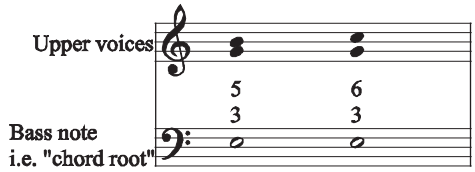
> writes out the succession of chord roots as the 'fundamental bass' (*basse fondamentale*). The result may look like a continuo bass line. But it is not meant to be played; rather, it depicts the succession of the chords generators [or, as cited earlier, "sources"]. (Lester 2002: 761.)

Basically, the concept of fundamental bass means that the detection and determining of a chord's root is made by means of "restoring" a chord to a stack of thirds (see Rameau 1971: 40). This gave an important role to the imaginary bass line (see e.g. Williams & Ledbetter 2004). Moreover,

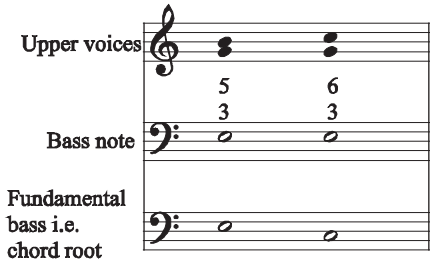
> by including seventh chords as well as triads in the category of invertible chords generated by a fundamental, he [Rameau] easily explained the resolution of many dissonances hitherto deemed anomalous. Thus, Rameau's approach explains why the fifth in a 6/5 chord is a dissonance: its essence is not a consonant fifth over the bass, but rather as the seventh over the fundamental bass of the chord. (Lester 2002: 760.)

The theory of figured bass for continuo playing was formulated under the influence of the intervallic rules of Renaissance polyphony. This meant that, at least in theory, chords were thought in terms of the framework presented by Zarlino: generated by the superposition of intervals, not by inversion. In the Baroque era, Zarlino's views on harmonic foundations gained importance in the theory of continuo, and unlike today's common way of thinking the chords were thought as various intervals built on the bass as designated by the figures above it (e.g. Williams & Ledbetter 2004). Thus, the note determining the chords identity or "class" (in modern terms: chord root) was always the bass note. However, amongst practising musicians, the concepts of inversions and fundamental bass gained wide acceptance because they were very useful and accord well to the practice of continuo playing; these concepts had been put into practice even before Rameau sought their theoretical foundation (e.g. Lester 2002: 754–759). In this matter theory and practice were not the same.

In the practice of continuo playing, Rameau's way of thinking in terms of triadic chords had long played an important role, whereas the theory relied on earlier tradition. The difference between earlier and the "modern" approach are illustrated in Examples 4.17 and 4.18 (cf. Riemann 1977: 220).



Example 4.17. The 5/3 and 6/3 chords according to the intervallic theory of figured bass and counterpoint.



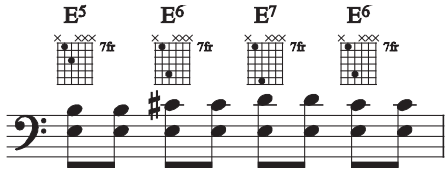
Example 4.18. The 5/3 and 6/3 chords according to the fundamental bass theory.

An additional note has to be made here regarding nomenclature. Since the mid nineteenth-century, common-practice harmonic analysis has adopted a peculiar mixture of the two traditions. Roman numerals denote the chord root according to Rameau's fundamental bass. On the other hand, inversions are labelled according to the conventions of the earlier practise of figured bass and counterpoint. Arabic numerals are spelled from the lowest sounding note. According to common practise nowadays, chords of the previous examples would be labelled III^{5}_{3} and I^{6}_{3} in the key of C major (e.g, Aldwell & Schachter 1989: 52; Salmenhaara 1968: 38–40). This mixture of two systems, which seems to confuse undergraduate students of music theory from time to time, has nevertheless become a common standard.

4.4.2. Intervallic Construction and Inversions in Heavy Metal

In addition to common-practice tertial chords, there are other structures common in rock and heavy metal – structures that seem to be generated according

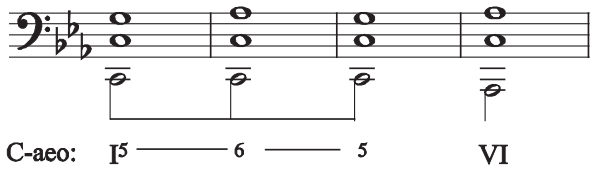
to the earlier, intervallic thinking. As Tagg suggested a "chord" in the context of popular music is usually formed with at least *two* different notes. In traditional text-book harmony this kind of construction would be usually called rather an interval than a chord. However, much rock music and especially heavy metal is dominated by *dyads* (i.e. two-note chords). The following example will illustrate this. The basic rock 'n' roll accompaniment pattern employed by Chuck Berry and many others from the 1950s on includes intervals of the fifth, major sixth and minor seventh in succession (Example 4.19). For instance, the beginning of Steppenwolf's "Born to Be Wild" is based on this pattern. The chord symbols for this example follow Matt Scharfglass's (2004: 111) "performance & analysis" column for *Guitar World* magazine. Note that these chord symbols denote dyads, not triads or tetrads.



Example 4.19. An intervallic rock 'n' roll guitar pattern.

In cases like this where the lowest tone is kept the same, it appears to be the point against which the other tones are measured. This is the case especially with dyads: interpreting the major-sixth dyad *e-c*♯ as an inversion of a C♯ minor triad (with omitted fifth) does not do justice to the music and is not very useful for analytic purposes. In this study it is suggested that, since in most heavy metal there is such a strong emphasis on the lowest tones (bass notes), the analysis should also be based on them. In other words, it is suggested that the chord construction in heavy metal accords better with intervallic theory (figured bass after Zarlino) than with fundamental bass theory (inversions after Rameau).

A very common dyad in heavy metal is the minor-sixth dyad. This dyad often appears between power chords, and is mainly used in various kinds of passing motions. There seems to be three main uses of the chord. They are presented and discussed in the following. A common case is to use the minor sixth dyad in a contrapuntal oblique motion (e.g. Fux 1971: 22; Aldwell & Schachter 1989: 71). In this case a minor sixth appears in between two power chords as a neighbouring chord. The riff starting the verse of Accept's "Metal Heart" (*Metal Heart* 1985) is a typical example (Example 4.20).

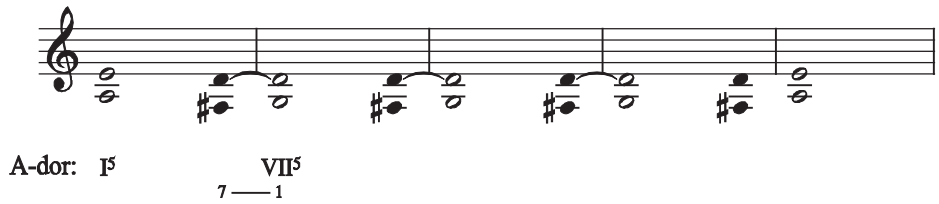


Example 4.20. Chord progression in the verse of Accept's "Metal Heart" (guitar and bass parts).

Contra Rameau, the dyad C-Ab is here put in the same chord category as C-G – that of chords based on I – whereas the Ab-C belongs to the chords based on VI . Although this example is easy to explain as a passing note in the top voice, it is crucial to the theory in hand that the minor sixth (in m. 2) differs from the major third (in m. 4). Actually, this kind of application of C-Ab is quite near to Riemann's *Leittonwechselklang* ("leading tone exchange") that refers to replacing a chord's fifth with its upper, or a chord root with its lower leading tone (see Riemann 1961: 527–528) Iron Maiden's "The Number of the Beast" presents an example of the latter.

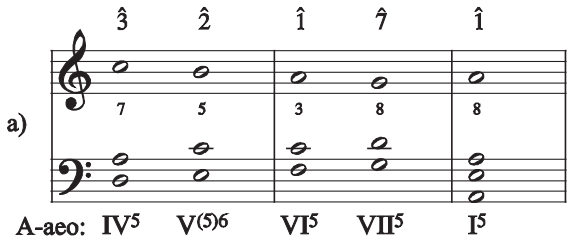
The analysis can and should be verified by listening to the progression, paying particular attention the point at which the change of chord root is perceived. As suggested here, the movement from the first C^5 power chord to the minor sixth C-Ab and back to C^5 is built an a root tone C. According to this interpretation, the harmony lies on the first degree for the first three bars – presenting its two different appearances (cf. Fux's 6/3 chord). After these the chord root changes unambiguously to VI. This is due to the strong emphasis on C that is doubled in multiple octaves, until m. 4 when the bass guitar interrupts the dominance of C. The second occurrence of C-Ab is coupled with a bass movement from C to Ab. On this occasion, all the parts (the guitar and the bass) work together for the harmonic series of Ab. In that sense, the sixth in the m. 2 appears as more dissonant than that in m. 4. As power chords, the minor sixth is very rich in sound due to distortion. Without any help from the bass, the lowest tone here remains on C and the ear tries to maintain with this root tone. The intermodulation components, however, create a harmonic series of Ab, thus creating perceptual confusion.

Another common use of the minor sixth is presented by AC/DC's "Highway to Hell" (*Highway to Hell* 1979) in Example 4.21. Here, the minor sixth appears as an incomplete neighbour note (the term is used after Aldwell & Schachter 1989: 11), again in oblique motion. Otherwise, the arguments remain the same as with the previous example. For Riemann, this again could be an example of *Leittonwechselklang*; only this time it is the lowest tone of the fifth that has been substituted for the minor sixth. In analysis, this appears as a movement to the chord's leading tone (marked as 7) to the root (1).



Example 4.21. Guitar chords in "Highway to Hell".

The third typical use of the minor sixth is exemplified by Judas Priest's "The Sentinel" (*Defenders of the Faith* 1984) (Example 4.22). The open minor sixth is here presented in a similar direct passing motion (cf. Fux 1971: 21; Aldwell & Scahchter 1989 71). Furthermore, it can be seen as a common-tone preparation of the next chord. The excerpt is from the pre-chorus.



Example 4.22. Guitar chords and melodic line in "The Sentinel".

According to Rameau's "stacked thirds" theory, the second chord (the minor sixth) would be III in its first inversion. However, this proves to be problematic. The first and the most important line that strikes the ear is the lowest: D-E-F-G-A. In this case, too, the bass line is doubled several times, which leaves the sixth of the second chord with little influence on chord-root detection; it seems to be, rather, a variation of the more common fifth. Moreover, the vocal melody on $\hat{2}$ that co-exists with the minor sixth forms a fifth with the bass note. This leaves the sixth even more isolated. To my ears, the C does not gain enough strength to act as a chord root. The sixth is ignored in the melody; the B is the second harmonic of the chord root. Thus, the sixth is left as only a colouring dissonance.

The possibility that the minor sixth may be heard as an inversion of the major third has to be allowed. Although this interpretation has been common for centuries, it is merely one way of hearing that is much influenced by musical and educational background. For instance, many heavy metal guitarists with whom I have discussed this issue refer to this dyad as a "chord of the

minor sixth" or at least name the lowest tone as the root. No-one in the Western world can avoid having being exposed to music of the common practice era. Still, the instrumental practises seem to affect how the dyad is perceived amongst heavy metal musicians.

The chord labelling here is built on an assumption that the intervallic theory is generally more appropriate to heavy metal than the theory of inversions. Thus, if there is no special reason for an exception, the lowest sounding note is spelled the chord root. The chord labelling is made accordingly.

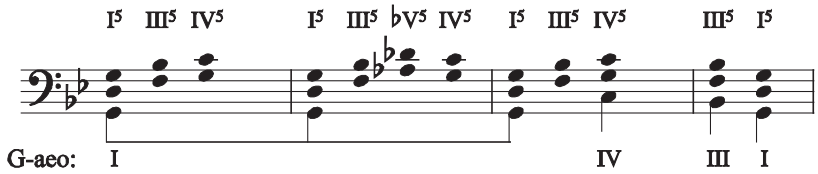
The dyad of the minor sixth is common enough to deserve a symbol of its own. The symbol $V^{(5)6}$ chosen here needs an explanation. The chord symbols used in guitar magazines and commercial note books typically have two ways of handling the minor sixth. It is either marked as an inversion (the sixth in "The Sentinel" would be C/E), or as an augmented fifth ($E^{+5(\text{no 3rd})}$). For the reasons discussed above and because of the implication of including a G, a symbol implicating an inversion is out of the question. On the other hand, calling a minor sixth an "augmented fifth" is unacceptable, when the modal and tonal context is taken into account.

The obvious choice for a symbol would have been a single number "6". In a very similar way to figured bass numbering, the intervallic numbers in the analyses made here are interpreted according to the mode in use; if one had an A minor mode, the number 6 on a bass note E would give an E and a C (and a G in figured bass). The "6" would make a nice parallel to the label of the power chord – "5" for the fifth, "6" for the sixth. Indeed, they seem to be parallel, at least if the guitar's instrumental technique is taken into account; it is very easy, as it is common practice, to shift from the fifth to the minor sixth by moving only one finger.

However, in the vocabulary of music theory and analysis the numeral "6" carries heavy connotations; it has at least two main uses. In traditional harmonic analysis (e.g. Piston 1962: 44) it stands for the first inversion of the triad. For instance, I^6 stands for the triad on the first degree with the third on the bass. A quite different usage is found in the common chord symbols frequently applied to jazz and pop/rock: "6" commonly denotes a triad with an added major sixth (e.g. C^6 includes C-E-G-A). Accordingly, in jazz and related styles the I^6 usually stands for the first degree triad with an added major sixth. The symbol $V^{(5)6}$ chosen here denotes the chord root (i.e. the bass note) with a Roman numeral and the fifth's absence with parentheses. Since the bass is usually strong, its third harmonic partial (i.e. the interval of the fifth) should be relatively strong, too. In this way the label chosen here might be even more descriptive symbol than a single number six; $V^{(5)6}$ can be read as taking the fifth's presence in harmonics into account.

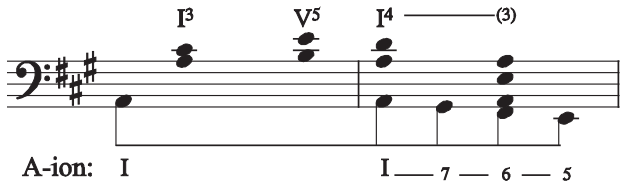
"The 4th has a unique position in Western music because it has been regarded as a perfect interval (like the unison, 5th and octave) and a dissonance at the same time" (Drabkin 2003). This has held true since Rameau. According to Piston & DeVoto (1987: 15) "the perfect fourth is dissonant when it stands alone. It is consonant when there is a third or perfect fifth below it." However true this might be in common-practice harmony, in some cases the fourth can be considered to be consonant even when it stands alone. This is the case with power chords that are made up of an interval of fourth.

The chord of the fourth has these two uses in heavy metal too; either the higher or the lower tone is perceived as a chord root. When the higher tone is perceived as the chord root, it usually works as an inverted fifth (i.e. as a power chord). In that case, the harmonic series of the higher tone is an overriding element in perception. This is the case of the guitar riff in Deep Purple's "Smoke on the Water" (*Machine Head* 1972). Deep Purple's guitar player Ritchie Blackmore often applies these kinds of power chords particularly in riff-type guitar patterns. In cases like this the bass many times acts as a pedal point (Example 4.23). These kinds of power chord can be heard as single melodic lines, the sound of which is strengthened with a perfect fourth below. In this case, the pedal point in the bass helps to establish the tonal centre and joins in to support the last four chords.



Example 4.23. Reduction of the riff to "Smoke on the Water" (guitar and the bass parts).

Sometimes tonal environment and voice leading practices call for another kind of interpretation. When the perfect fourth is in relation to the bass (i.e. the fourth's lower note is on the bass), it is usually considered as a dissonance (Salmenhaara 1968: 25) or at least "unstable" (Drabkin 2003). In this case the fourth has to resolve to the third or the fifth. This kind of usage of the perfect fourth can frequently be detected, for example, in the music of Judas Priest. For instance, "Devil's Child" (*Screaming for Vengeance* 1982) has an E-Dorian I^5-$IV^{4–3}$-I^5. This suspended fourth is also found in Ozzy Osbourne's "Crazy Train" (*Blizzard of Ozz* 1981) (Example 4.24).



Example 4.24. Reduction of the riff to the verse of "Crazy Train" (guitar and bass parts).

The guitar dyads are played against a pedal point on scale degree one. As marked in the reduction, the bass is embellished with passing notes (8)–7–6–5. The perfect fourth's resolving on the first degree sounds just like a classic suspension-resolution I^{4-3}. However, the most intriguing feature in this example is that the third of the last chord (i.e. the resolution tone) is not actually played – therefore, for the analysis, it is placed in parenthesis (3).

Still, the third can be heard quite clearly. There appears to be two reasons for this. The first is tied to the tonal expectations. The ear of the average Western listener is so well trained in major/minor tonal music that it expects to hear the fourth of this kind resolving to the third. The fact that the suspended fourth on I usually resolves to a more stable third is common enough to create expectations for hearing a C♯ even though it was not actually played. In fact, I have heard many guitarists playing the originally missing C♯ for this song – thus, it appears that the C♯ is relevant to them. Moreover, as discussed earlier, the C♯ is acoustically present in the harmonics of the A power chord. This is the place to recall Pete Townshend's words that were cited previously: "I hear the third in distortion." Thus, the perception of this musical phenomenon is affected by both culturally-based expectations of an expert listener, and the chord's acoustic structure.

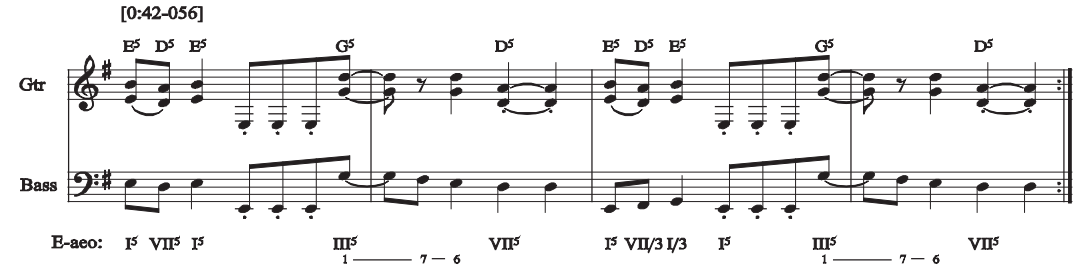
The mode of a piece might also be a factor in how the fourth is perceived. Of the two previous examples, "Smoke on the Water" is a minor-related Aeolian and "Crazy Train" is Ionian (i.e. common major mode). It seems to me that the expectation towards I^{4-3} resolution is enhanced in major related modes, at least in distorted contexts. In major modes the resolution tone (the third) is in accordance with the harmonic series (i.e. major), whereas in minor related modes it is not. Hence, if one was to accept the IV^5 chords in mm. 1–2 of "Smoke on the water" as such suspensions as I^{4-3} in "Crazy Train", the expected resolution tone should be a minor third. On the other hand, if one expected them to resolve to major thirds (which, due to distortion, should be more likely expected than a minor third), there would be a mismatch with the mode. Thus, in these ways of hearing there is a conflict between tonal/modal and acoustic structure. In this case, the modal/tonal context (minor third in the mode) and

chord structure's acoustics (major third as a harmonic partial) are in conflict. Although there are different ways of hearing, I hear the modal interpretation in this instance.

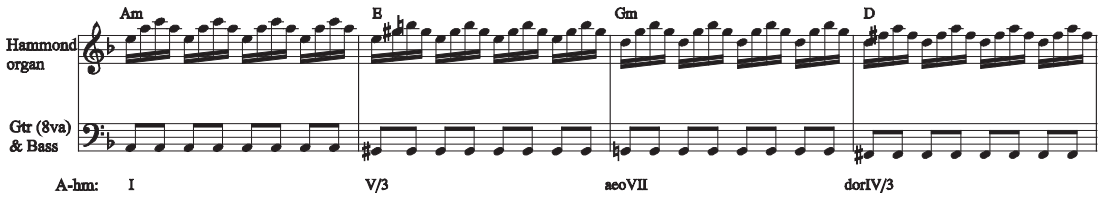
A more traditional explanation, however, relies on metric distribution. In common-practice thought the fourth is usually heard as a suspension, when it appears on a strong beat and the resolution on a weak. This is the case with "Crazy Train", whereas in "Smoke" the situation is reversed. Because of this the IV^5 is difficult to hear as I^4.

Voice leading type may also affect the root tone perception of the fourth. The "higher note as a root" interpretation of "Smoke on the Water" is reinforced by the fact that the interval harmonizing the riff's melody does not change. Those kinds of unchanging intervals (i.e. chromatic parallel motion) tend to melt into the main line, thus becoming a part of its sound. In those cases the melody and its harmonizing interval are likely to be perceived as a whole – as a one-note melody, where the lead voice is supported with an unchanging interval structure. This concept is also known as "chord melody" (Salmenhaara 1980: 392). This is usually not the case with diatonic intervals; especially when they act according to the traditional voice leading and have more independence. For example, harmonizing "Crazy Train's" riff with diatonic intervals creates a need for resolutions within the riff more than chromatic parallel intervals would do.

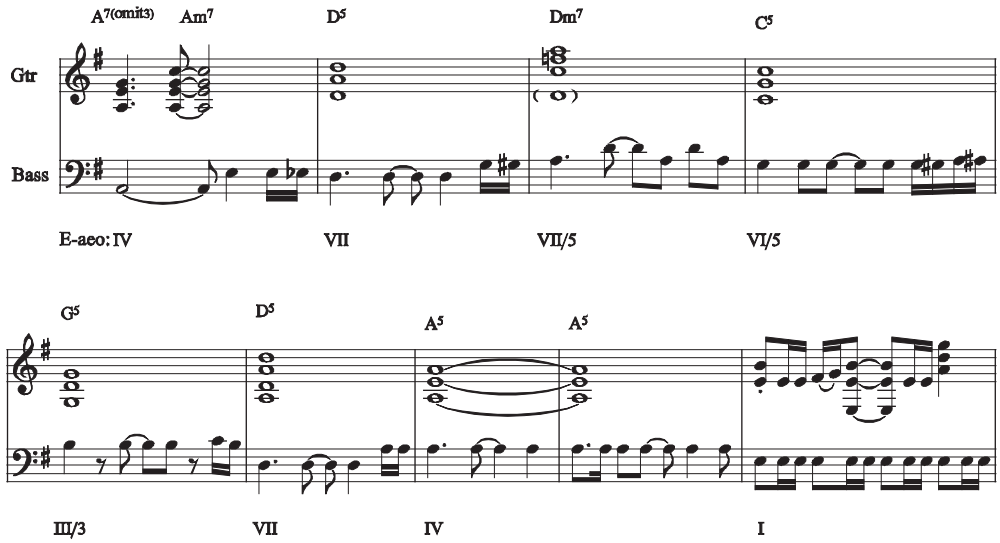
Although individual chords in heavy metal are best understood in terms of intervallic construction, traditional inversions are used on occasion. They are not often applied to individual chords as such, but rather to harmony formed by several instruments. Usually the bass guitar plays some other chord tone than the root. In Example 4.25 of Judas Priest's "Green Manalishi (With the Two-Pronged Crown)" (*Unleashed in the East* 1979) the bass transforms the power chords of m. 1 into first inversions (i.e. the third of the triad is in the bass). In addition, if one wishes, the power chords with a slightly independent bass line in mm. 2 and 4 may be interpreted as inversions (i.e. G5 with the root, the seventh and the sixth on bass, or, the last one alternatively as an Em7). However, a more likely interpretation would probably be in terms of passing notes on the bass instead. Deep Purple's "Highway Star" (Example 4.26) presents a feature that is also typical of Baroque composers (cf. Motte 1987: 74): a chromatically descending bass line makes the common triads on the organ appear as inversions. The transition/bridge section of Black Sabbath's "Heaven and Hell" (Example 4.27) presents a different case; this example is atypical for most Western music and rare also in classic heavy metal. The bass part frequently relies on subsequent inversions; most notably on second inversions (i.e. the fifth on the bass as in mm. 3–4).



Example 4.25. Instrumental interlude between verses in "Green Manalishi" (ca. [0:42–0:56]).



Example 4.26. "Highway Star" (organ solo).



Example 4.27. Black Sabbath: "Heaven and Hell".

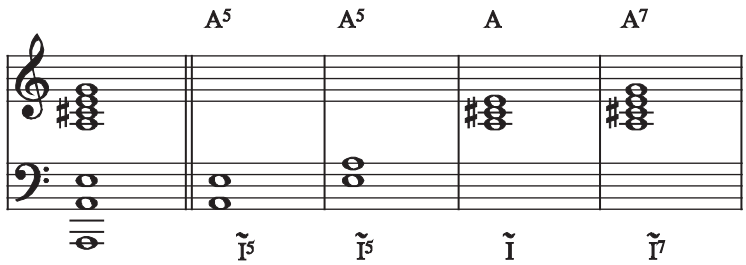
The relation of inversions and intervallic construction in heavy metal, call to mind Diether de la Motte's (1987: 24–25) remarks on how musical construc-

tion changed from Renaissance to Baroque. "Understanding of the music in the turn of the sixteenth and seventeenth century requires that the chord of the sixth must be *heard differently*: it is not a result of inversion, but rather it results from adding to bass note the third and the sixth and not the third and the fifth, as usual." Motte's observations are based on the different way the doubling of voices was conducted in these chords. The understanding of chords was not consistent, and as Motte points out, the music, in that time, included both the old and the new chords of the sixth. This idea fits well to heavy metal, although real inverted harmonies seem relatively rare.

4.5. Consonance and Dissonance of Distorted Chords

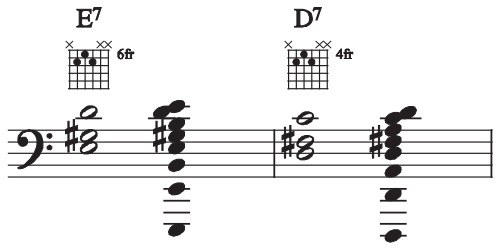
As suggested earlier, some chord structures create a more complex sound than others. This relative complexity is here taken as the basis for the classifying consonance and dissonance in distorted chords. Any division of consonance and dissonance is, at best, arbitrary. However, the division here is based on 1) frequency of occurrence, and 2) relative simplicity of structure regarding acoustic characteristics. For instance, as discussed earlier, the power chord and the major triad are relatively simpler than the minor triad. This division applies to vertical chord structures that are mostly played by a single instrument. The examples are given in relatively low frequency regions, because they are usually thought as the more important in determining the overall impression of consonance (e.g. Moore 2003).

The most frequently used distorted chord structures conform to the lowest harmonics of the fundamental. The structures presented in Example 4.28 all accord with the lowest seven harmonic partials of the harmonic series of the same distortion fundamental. Due to distortion components, they form the harmonic series of *A* (55 Hz), thus, creating a sensation of *A* as root tone. These structures are here called *vertical consonances*. In the analyses, a special symbol is used to identify them; a tilde (~) is placed above a chord symbol; especially when a chord is not in accordance with a mode in use.



Example 4.28. Vertical consonances.

The dominant seventh structure is here seen as consonant. It seems to fulfil the above criteria better than, for example, the minor triad; this position obviously contradicts the common practice theory of harmony. Dominant sevenths are frequently used in blues-derived rock. As the power chord and the major triad, the structure abides by and strengthens the harmonic series of its fundamental. Depending on the voicing, at least the fourth, fifth and the seventh harmonics are present in the actual played structure. Along with these, Example 4.29 shows some intermodulation components of two dominant sevenths in Cream's twelve-bar blues based song "Politician" (*Wheels of Fire*, 1968).



Example 4.29. Dominant seventh chords in "Politician" (bars 9–10).

In his theoretical study, Tolonen (1969: 174) presented a division of intervals to 1) stable, 2) semi-stable, and 3) unstable, in which the intervals were categorized by their frequency ratios. In "stable" intervals the lower tone is either 1 or a power of 2, in "semi-stable" intervals the higher tone is a power of 2, and in "unstable" neither of the two tones are either 1 or a power of 2 (Table 4.3).

Tolonen's division seems to accord conveniently with what has been presented here. However, this is only if the system is limited to the first eight harmonics. The same logic, if taken further (e.g. to the tenth harmonic as suggested by Tolonen; see Chapter 3.3), gives rather disturbing results regarding musical practice. For instance, several kinds of minor sevenths and major seconds included in the first ten harmonics would fall into the categories of stable or semi-stable intervals (giving, e.g. the minor second 9:8 a more stable status than the perfect fourth). However, it is of interest, how surprisingly well a theory that was presented in 1969, and thus constructed well before heavy metal's rise into the popular mainstream, fits to this music. For instance, Tolonen's first category includes vertical consonances, except for the fourth, which he calls semi-stable. In a sense, this is also true in heavy metal, although not by the fourth's structure as such, but by its two-fold use (inverted power chord

or a suspension). The minor sixth and all the "unstable" structures are here considered dissonant, although the justifications are different.

1. Stable	2. Semi-stable	3. Unstable
octave (2:1) fifth (3:2) major third (5:4) natural minor seventh (7:4)	fourth (4:3) minor sixth (8:5)	minor third (6:5) major sixth (5:3) diminished fifth (7:5)

Table 4.3. Interval categories suggested by Tolonen (1969: 174).

Compared to vertical consonances, other structures give more confusing signals to the ear. This was already shown in the comparison between major and minor triads in Chapter 4.3. If a minor sixth is played with distortion, the result is similarly dissonant. In the power chord *A-e* both tones and their intermodulation components fall within the same harmonic series (cf. Chapter 4.2). Compared to the dyad *A-f* the harmonic and intermodulation components are not as much in accordance. Example 4.30 lists some components of the power chord and the sixth. Within this relatively low frequency region, the components of the sixth form intervals that are considered dissonant also in common practice harmony; the power chord has fewer dissonances.

A-e: $A - e - a - c^{\sharp}' - e' - g' - a' - b' - c'' - d'' - e''$

A-f: $A - e - f - a - c^{\sharp}' - e' - f' - g' - a' - b' - c'' - c^{\sharp}''$

Example 4.30. Components of a power chord and a dyad.

The dyad *A-f* (440 Hz and 176 Hz) creates a harmonic series of the distortion fundamental *F'* (22 Hz), whereas the *A-e* (110 Hz and 165 Hz) creates that of *A* (55 Hz). Hence, the distortion fundamental of the sixth is considerably lower and in this particular case barely audible, since it occurs at the limit of human hearing. Even if the intervals were played in a high enough region to make the distortion fundamental more audible, the sixth is still relatively more complex than of the fifth. It has been argued recently that (when based on a single root tone, in this case *A*) the lower the distortion fundamental, the more dissonant an interval (Penttinen et al. 2009: 155–156). Since the distortion fundamental of the minor sixth is lower than those of the vertical consonances, it may be concluded that it is relatively more dissonant than any of them.

Not only is the consonance/dissonance axis relative. Vertical consonances also present a relative degree of complexity, increasing from left to right in Ex-

ample 4.28. The use of distortion has made this clear in musical practise. The amount of distortion has increased over time (e.g. Berger & Fales 2005), and a similar development can be seen in the use of chords. While the distortion has increased, chord structures in use have gradually become simpler. Dominant sevenths and major triads were frequently used in blues rock and early heavy metal, but much less in the late seventies, and by the 1980s the power chord was clearly the most popular structure in heavy metal.

It is suggested here, that the classification presented is useful for the analysis of vertical structures of heavy metal. The division of harmony into consonant and dissonant has always been a major compositional tool in Western music. Although the division and the rationale have varied over time, the tendency has almost always been towards consonances and away from dissonances. "Compositions must be composed primarily of consonances and only incidentally of dissonances" (Zarlino 1968: 53). This seems to hold true in heavy metal, in which the use of dissonant structures in distorted chords is rather rare.

4.6. Chords in Modal and Tonal Context

This chapter concentrates on how heavy metal chord structures relate to their tonal and modal contexts. First they are examined from the point of view of classification systems of traditional harmonic theory, after which a new system of classification based on vertical consonance/dissonance division is introduced. It is suggested that examining heavy metal chord construction from a different point of view will increase our understanding of the underlying rationale, which to varying degrees may differ from that suggested by traditional models.

4.6.1. Chord Categories in Traditional Music Theory

There are many kinds of classification systems found in traditional music theory. The main common features of these are presented in Figure 4.8. Chords are first divided into diatonic and non-diatonic, according to their relation to the overall modal scale. Diatonic chords are understood here as chords exclusively employing scale degrees of one single mode, whereas non-diatonic chords have at least one scale degree outside that mode. Non-diatonic chords are usually subdivided into different kids of subcategories, and are mostly labelled as altered. "The altered formation must be foreign to the scale presently in effect" (Persichetti 1961: 238). Most common subcategories of altered chords in traditional theory are modal, tonal and chromatic, according to the type of alteration. The outline of the division presented here is based on Erkki Salmen-

haara's theoretical and analytical writings.[17] Salmenhaara (1968: 87, 1980: 201–225, 317) aimed towards an extremely systematic division, by comparison with those made by some other theorists (cf. Piston 1962: 276–277; Forte 1962: 96, 355–365; Persichetti 1961: 237–240; Schoenberg 1966: 211–212, 267–271, 421–431). *Modal altered* chords are "borrowed" from the parallel mode (e.g. F minor chord in the key of C major is "borrowed" from C major's parallel mode, C minor). *Tonal altered* chords cause a temporary shift of tonal centre (e.g. secondary dominants). The rest are called *chromatic altered* chords; they result from chromatic alteration that cannot be explained by the previous two categories. The following discussion and examples show how these traditional chord categories relate to heavy metal music.

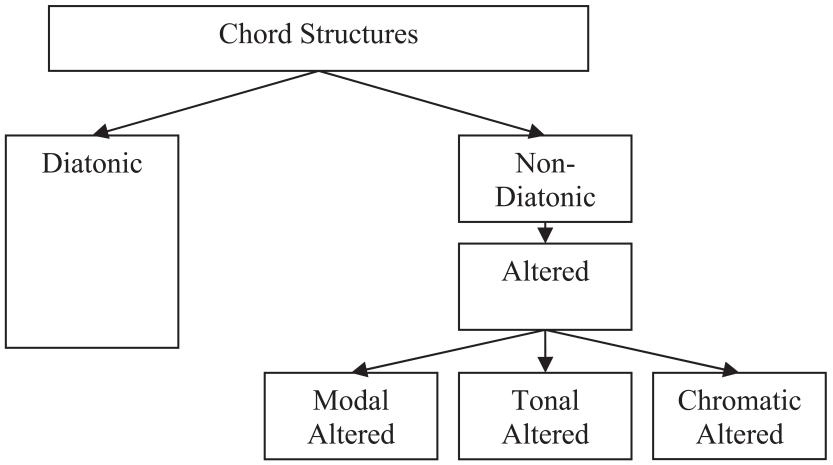


Figure 4.8. Traditional division of chord structures.

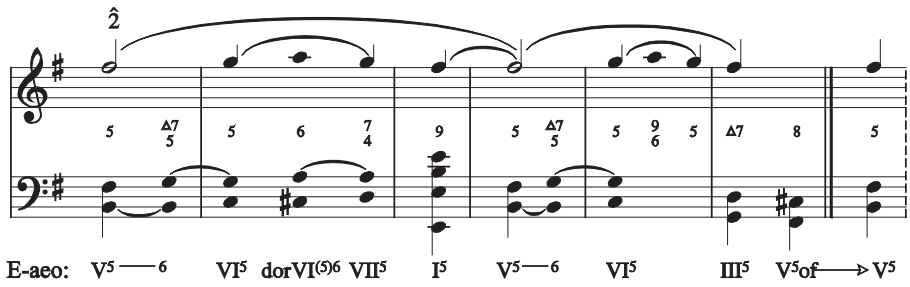
Modal Altered Chords

Modal altered chords are borrowed from a mode other than the current one. In traditional harmonic analysis, the modes within one tonality are the major and its parallel minor (e.g. C major and C minor). By adopting the modal system the boundaries of this category are expanded. Hence, in the following analyses the concept of modal alteration is extended to the other modes. My analytic labelling is derived from Moore's system (cf. e.g. Moore 2001: 54, 1992: 75–76) according to which the abbreviations of mode names are attached to Roman

17. Erkki Salmenhaara (1941–2002), a composer and a musicologist, was one of the most influential and respected music theorists in Finland (see e.g. an obituary by Guy Rickards 2002).

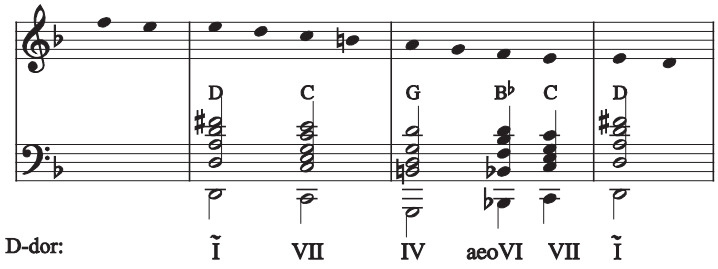
numerals where necessary (e.g. dorIV would denote a triad on the fourth degree of Dorian mode). Similar labels to this has been used before (e.g. Schenker 1954: 111), although not to the same extent.

In the material studied here, the Aeolian appears to be the most common mode. In most cases, modal alteration is, then, a departure from Aeolian. Quite often an Aeolian chord progression is extended with a chord from Dorian mode. This is the case with, for example, Judas Priest's "When the Night Comes Down" (*Defenders of the Faith* 1984), in which the open sixth chord on VI can be seen as a Dorian loan (Example 4.31). That is, an E-Dorian chord in an otherwise E-Aeolian context. The vocal melody, which is predominantly centred on $\hat{2}$, locally forms apparently sharp dissonances with chord tones (e.g. major sevenths indicated by Δ7). Octave unisons between chord tones and melody are marked if they have any special significance – otherwise they are left out. For example, in the sixth bar the change of function of the $\hat{2}$ from major seventh to octave is shown this way. In mm. 1–2 and 4–5 passages from V5 to I5, and from V5 back to V5, respectively, are in oblique motion. The other passages use parallel voice leading (Aeolian VI5 to Dorian VI(5)6, and III5-V5ofV). Dissonances are arranged to occur mainly in off-beats as passing (mm. 1–2 and 4) or neighbour notes (m. 5). There are only two down-beat dissonances: firstly the major ninth in I5 (m. 3), which is resolved to after the second repetition of the passage (not shown); and secondly the major seventh (m. 6), which is resolved by the progression III-VofV that consequently changes its function to a chord tone.



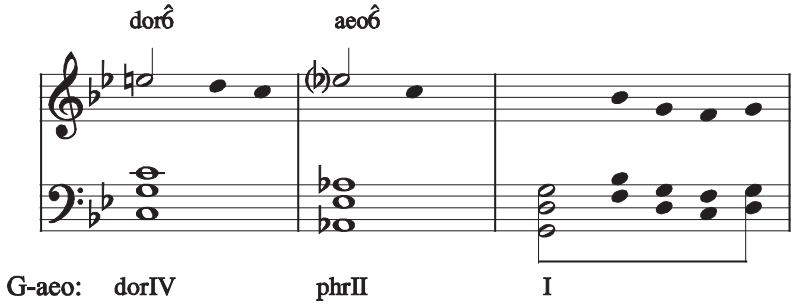
Example 4.31. "When the Night Comes Down", a reduction of the transition-like section just before the guitar solo.

The interchange between Dorian and Aeolian is evident in Cream's "White Room" (Example 4.32). In this case, the melodic line strongly underlines D-Dorian, which means that the Aeolian VI is interpreted as a modal loan.



Example 4.32. "White Room" (verse).

In Example 4.33 the chromatic descent of the lead vocal part from Dorian $\hat{6}$ to Aeolian $\hat{6}$ is accompanied with Dorian IV and Phrygian II. The guitar applies three-note power chords, but the vocal part means that the chords are perceived as major triads.

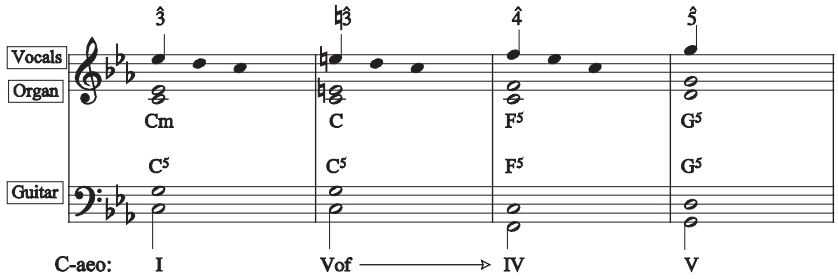


Example 4.33. Harmonic and melodic outline in the chorus of "Smoke on the Water".

In terms of common practice theory, these harmonies are not particularly exceptional – the IV degree is borrowed from melodic minor and the flat II is a Neapolitan chord. Salmenhaara (1968: 112) and Piston (1962: 288–289) count the Neapolitan chord as a *chromatic* altered chord, because the Phrygian does not qualify as an analytical mode in their theories. In these cases, only the major and minor variations of $\hat{3}$ and $\hat{6}$ (and sometimes $\hat{7}$) can pass as modal degrees (cf. Salmenhaara 1980: 197, 207; 1968: 88–89; Piston 1962: 32; Harrison 1994: 17; Rameau 1971: 157). However, from the point of view of modal system the phrII is a modal altered chord. In fact, this interpretation has also been suggested by traditionally oriented music theorists: a progression of the half step has been called a Phrygian cadence before (e.g. Sadai 1980: 142, 413; Schoenberg 1967: 33). In his earlier writings Schenker (1954: 109–110) also decides not to use the term "Neapolitan chord", and chooses the "Phrygian II", instead.

Tonal Altered Chords

The effect of *tonal altered* chords is directed towards the tonal centre. In these cases the tonal function of a chord is altered, and a non-tonic chord degree is given the status of temporary tonal centre (e.g. Salmenhaara 1968: 95). This is rather near to Schenker's (1954: 256) concept of *tonicalization*. From the point of view of traditional harmony, the most typical tonal altered chords are the secondary dominants – such as in Uriah Heep's "July Morning" (*Look at yourself* 1971) (Example 4.34). When the C minor triad is changed to a C major its tonal function is changed from the tonic of C-Aeolian to the dominant of F.



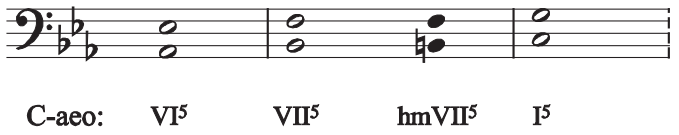
Example. 4.34. A secondary dominant in "July Morning".

As often happens in Uriah Heep's music, the Hammond organ fills out the guitar's power chords into triads. Again it is noteworthy that the organist applies rather classical voice-leading whereas the guitar plays in parallel motion. Also the melodic line of the vocals is treated in a manner that is common classical harmony with secondary dominants. This is again an example of the interplay between two traditions – guitar-derived modality and classical voice leading.

In heavy metal the secondary subdominants seem to be common as well. For instance, "Hey Joe" follow the cycle of fifths, but in a reversed order, thus forming a chain of secondary subdominants: IV of IV of IV of IV of I. Similar progression are found, for example, in Deep Purple's "Hush" (*A's & B's* 1988 [1968]), "Fireball" (*Fireball* 1971), and "Burn" (*Burn* 1974), Rainbow's "Kill the King" and "Long Live Rock 'n' Roll" (both from *Long Live Rock 'n' Roll* 1978), Judas Priest's "Devil's Child" (*Screaming for Vengeance* 1982), and Black Sabbath's "A National Acrobat" (*Sabbath, Bloody Sabbath* 1973). All of these examples are based on the Aeolian mode. In many of these, however, the chord structures are not actually altered in any way, but due to the chord root relationships the dominant or subdominant function is nevertheless apparent. This was discussed earlier in Chapter 3.4 in the context of harmonic function.

Chromatic Altered Chords

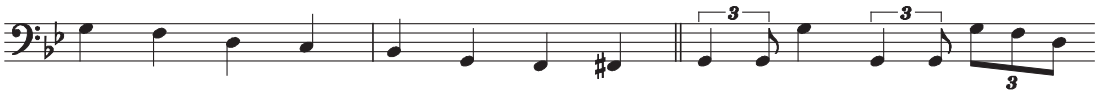
Tonal and modal altered chords are borrowed from another tonality or mode, whereas chromatic altered chords cannot be understood in this way (cf. Salmenhaara 1980: 317). The first two categories have been extended compared to Salmenhaara's classification, so that the category of modal altered chords, for example, is much wider. Whether or not a chord can be understood as a tonal or modal borrowing is not always black and white. For instance, a diminished chord that sometimes occurs in Aeolian context could be analyzed as a borrowing from the harmonic minor, as shown in Example 4.35, which is taken from Dio's "Holy Diver" (*Holy Diver* 1983).



Example 4.35. Diminished fifth in "Holy Diver".

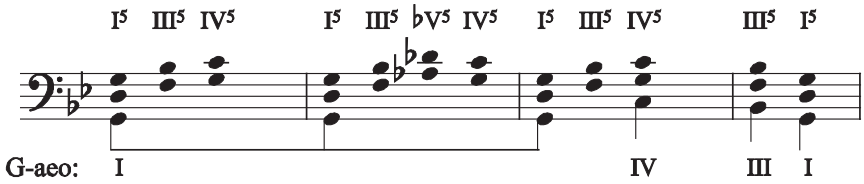
Although the diminished fifth is an alien formation to the Aeolian mode, and may be seen as a chromatic chord, it can also be interpreted as a modal altered chord. This requires one to accept that the harmonic minor (abbr. hm) can be applied to modal scales. The influence of classical music on heavy metal makes this seems reasonable; in Western music the harmonic minor has been one of the most common musical scales for not less than four hundred years. In a larger scale analysis these kinds of constructions are usually interpreted as chromatic passing chords. Still, as a single unit it may be seen as a modal loan. However, the relationship here between the Aeolian mode and the Harmonic minor mode is more plausible than in common practice music. Since the Aeolian is more common in heavy metal, chord arising from the harmonic minor may be interpreted as altered formations in most cases.

The bass line doubled with guitar in Rainbow's "Long Live Rock 'n' Roll" (*Long Live Rock 'n' Roll* 1978) presents a rather similar case. An otherwise minor pentatonic line – that in this case represent chord roots – moves chromatically from Aeolian VII to harmonic minor VII to the tonic (Example 4.36).



Example 4.36. An excerpt of the bass/guitar line from "Long Live Rock 'n' Roll" (ca. [0:13–0:18]).

As discussed in Chapter 3.2, the ♭V in the riff to "Smoke on the Water" (Example 4.37) can also be interpreted as a modal altered chord (i.e. locV). However, an alternative interpretation should perhaps come first. As previously stated, the riff may be considered as a single melodic line intensified by parallel fourths below. This melody probably derives from the so-called blues scale, which is common in blues-derived guitar solos (in this case, the applied scale steps are 1–♭3–4–♭5–4–♭3–1). In addition, the chord progression ♭V–IV is very common in many rock and blues songs based on the twelve bar blues' idiom – in bars 9–10 the ♭V often acts as a passing chord between V and IV. Thus, if the melodic features of this progression are emphasized, the blues-based chromatic reading seems to be more plausible than the modal one.



Example 4.37. Riff to "Smoke on the Water".

There are further examples of seemingly chromatic chords that traditional theory would label as altered, such as chords of the augmented sixth and dominant seventh structures with an augmented ninth. However, as suggested in the following pages, they can be understood differently. Because of this, and other reasons, a revised chord categorization model is proposed.

4.6.2. Revised Chord Categorization Model

Traditional chord categorization is based on a division between diatonic and altered formations; all chords are members of either one or the other. As suggested in the previous discussion of the acoustics of distorted chords, the division can also be made on the grounds of relative consonance and dissonance. In other words, a chord is either a vertical consonance or a vertical dissonance. When these two ways of division are combined, a diatonic chord can either be understood as a vertical consonance or a vertical dissonance; the same applies to altered, non-diatonic chords. This leads to the categorization model presented in Figure 4.9.

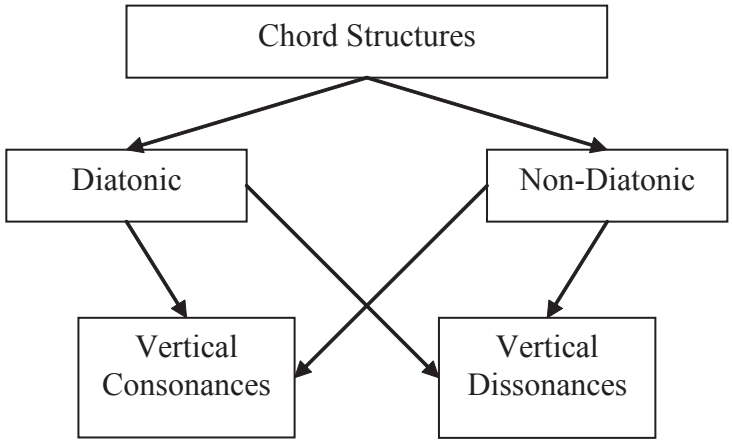
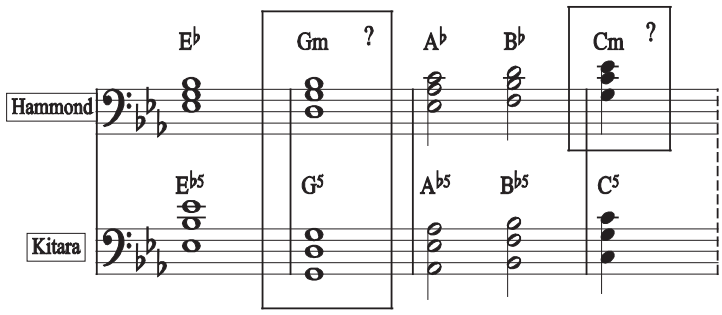


Figure 4.9. Revised chord categorization model.

Diatonic Vertical Structures

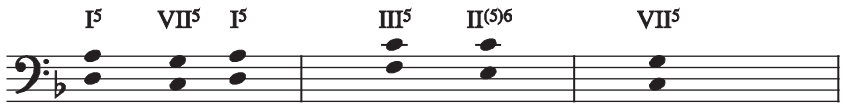
Diatonic vertical consonances follow both the mode and the simple acoustic structure, and thus need no further explanation. Hence, this chapter deals mostly with *diatonic vertical dissonances*. They follow the prevailing mode, but are dissonant when played with distortion.

For instance, all the chords of the chorus of "July Morning" are diatonic (Example 4.38). The organist fills out the guitar's power chords into diatonic triads. However, if the chords are explored aurally, it can be noticed that the Gm triad is considerably more unstable than the other chords. I suggest that the imbalance of this chord is due to its minor formation. The minor third does not support the harmonics of G, but causes a different harmonic series instead, and thus considerable beating. Since the distortion works similarly regardless of the instrument, it does not matter that this is played with Hammond organ. A dissonant effect is further emphasized by guitar's power chords that support the harmonics of G. The Cm triad on the last bar does not cause this effect to the same extent. A probable reason for this is that the chord is rhythmically interrupted before the rise of competing harmonic series. The analysis can be conveniently checked by using the panorama potentiometer to listen to one channel at a time – first the right channel with Hammond only, then both channels to add the guitar chords.



Example 4.38. Chorus section of "July Morning". Hammond (top stave) and guitar (bottom stave) parts.

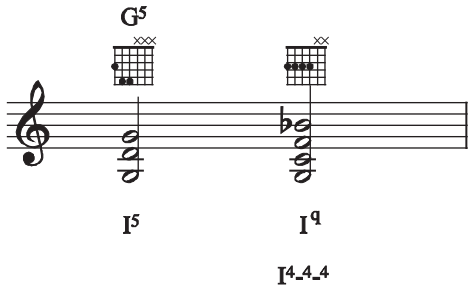
According to the model here, all distorted structures that do not abide by the lowest harmonics of the chord root are understood as vertical dissonances. Thus, the open minor-sixth dyad belongs to this category. By listening to musical examples it is possible to detect the relatively dissonant characters of the sixth, if compared to the surrounding power chords. Example 4.39 shows the dyad in Dio's "One Night in the City" (*Last in Line* 1984). Other examples, some of which were discussed earlier, are Judas Priest's "The Sentinel" (Defenders of the Faith 1984), AC/DC's "Highway to Hell" (*Highway to Hell* 1979), Accept's "Metal Heart" (Metal Heart 1984), Dio's "Holy Diver" and "Gypsy" (both from *Holy Diver* 1983), Mercyful Fate's "Desecration of Souls" (*Don't Break the Oath* 1984) and Iron Maiden's "The Number of the Beast" (*The Number of the Beast* 1982).



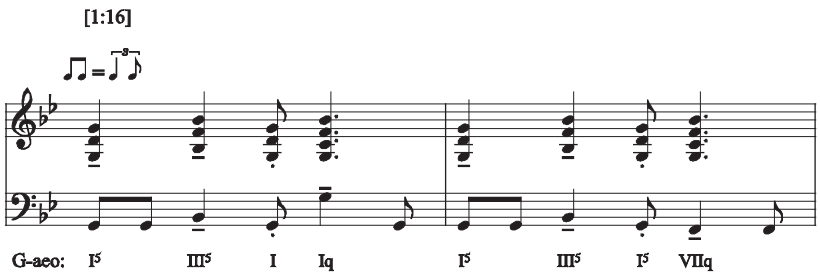
Example 4.39. Reduction of "One Night in the City" (chorus section).

An important characteristic of Black Sabbath's guitarist Tony Iommi is his frequent use of constructions formed from perfect fourths. These kind of *quartal* chords were also used by twentieth century composers (e.g. Persichetti 1965: 93–108) and jazz musicians of the post-bebop era. Quartal chords are here indicated with superscript "q" or with numerals indicating the number of stacked fourths (see Example 4.40). According to Persichetti (1965: 93) "[Q]uartal materials stem from ornamentation of the triad and from the techniques of medieval polyphony." However, as shown in Example 4.40, Iommi's quartal chords are typically produced by lifting two fingers off the fret board

starting from the power chord position. The chord sounds extremely dissonant compared to power chord. It may be used for creating a number of different harmonies depending on the note played on the bass; a practise also known to twentieth century composers: "like all chords built by equidistant intervals (diminished seventh chords or augmented triads), any member can function as the root" (Persichetti 1965: 94). Black Sabbath's "Fairies Wear Boots" (*Paranoid* 1970) gives a perfect example on this (Example 4.41). The guitar part (top staff) has an Aeolian one-bar riff including a quartal chord G-C-F-Bb. The bass riff lasts two bars; in the first bar it supports I, and in the second bar it supports VII. These two harmonies sound surprisingly different considering that they both have exactly the same structure on the guitar.



Example 4.40. G power chord and a quartal 4–4–4 chord.



Example 4.41. Quartal harmony in "Fairies Wear Boots".

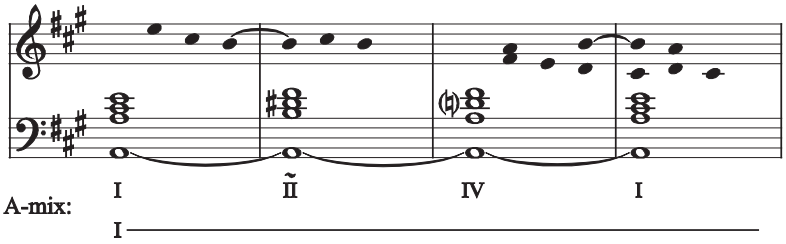
Non-Diatonic Vertical Structures

As in the traditional categorisation, all types of altered chords are non-diatonic. However, those non-diatonic chords that do not change the mode or a tonal focal point are of special interest. In a sense, these *non-diatonic vertical consonances* fuse into a single tone to support a chord's fundamental tone.

Thus, they are regarded as representatives of their root rather than altered in a traditional sense. These structures have not been subjected to any significant analytic or theoretical study. Allan Moore (1992: 81) briefly touches on the subject: "rock/pop/soul tends to conceive its harmonies as indivisible units rarely subject to voice-leading principles". Yet, no further explanation of these "indivisible units" is given. Due to distortion the chords that conform to the lowest partials of the harmonic series of the root, produce a clearer sound than other structures. However, in their tonal and modal surroundings they may seem strange – traditional theory might call them deviations from the normal.

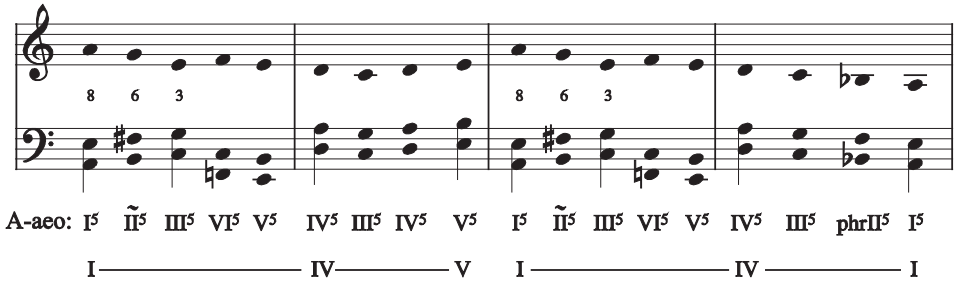
For example, the major triad on the first degree in "White Room" (Example 4.32) is not necessarily a secondary dominant. It does not appear to call for a resolution to IV, but clearly has a tonic function. Furthermore, it is not a modal altered chord, at least in a traditional sense. This kind of interpretation would assume that the modal quality changes fundamentally from minor (Dorian) to major (Mixolydian). The major third of the chord here is not modally significant, but an important part of the chord's vertical sonority instead. For instance, one can evaluate its significance by playing a D minor triad instead of D major (as is sometimes erroneously done).

Deep Purple's "The Mule" (*Fireball* 1971) presents a similar case (Example 4.42). The excerpt is analyzed in A-Mixolydian because the instrumental section before the verse quite clearly establishes the mode with the chords I-VII-I and the melodic tones A-B-C♯-D-E-F♯-G. Analyzing the II as a Lydian modal altered chord in this context does not quite capture its nature since it does not seem to establish a new scale. Even more misleading would be to interpret it as a secondary dominant, since the chord on V never appears. Actually, the II appears to be more tied to the next chord of IV. Similar chord progressions can be found in "July Morning" (though, ultimately leading to V), and in The Beatles' "Sgt. Pepper's Lonely Hearts Club Band" (1967). As in "July Morning" the chords in "The Mule" are played on the Hammond organ. Both bands were no doubt been aware of "Sgt. Pepper's". Among others, this may be taken as an example on how the guitar-derived voicing is moved to another instrumental context.



Example 4.42. "The Mule" (verse).

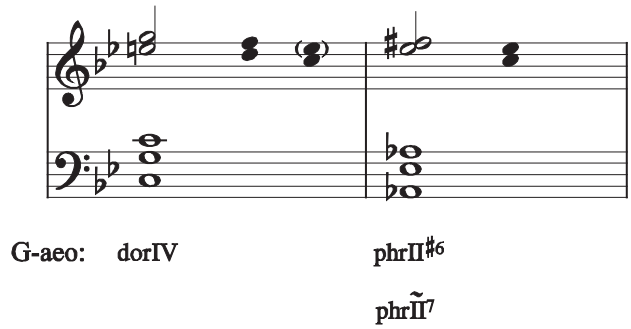
Example 4.43 illuminates the difference between a modal altered chord and a non-diatonic vertical consonance. The excerpt is from the "outro" of Dio's "Shame on the Night" (*Holy Diver* 1983). The passing chord II^5 between the I and III degree apparently includes an A-Dorian altered tone F♯. However, the F♯, while forming a perfect fifth with the chord root B, is fused with the fundamental and has completely lost its independence. The G of the vocal choir should form a harsh dissonance with F♯, but this impression is aurally nonexistent; a listener notices only, or at least primarily, the minor sixth between the B and the G. In this sense, the only altered chord here is the Phrygian II. Modal alteration is here directed to the chord root; hence, it is the only one of the chords where a new scalar content is explicitly present.



Example 4.43. The ending guitar riff to "Shame on the Night". The guitar part on the lower stave and the vocal choir on the upper.

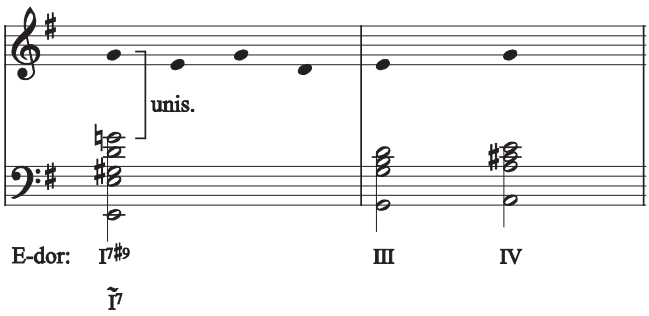
As stated before, some chords may seem strange in their contexts, but can often be explained by their vertical appearance. In heavy metal harmony in particular, it seems that the vertical direction is often more important than the horizontal one. In other words, a non-dissonant sounding of a chord is judged more important than following rigorously a certain mode. These chords are usually connected to modal and tonal context via chord root. Clearly, although their construction is chromatic in the traditional sense their meaning is essentially diatonic.

The following shows how this chord categorization model treats structures that would be called chromatic altered chords in traditional theory. In the chorus section of "Smoke on the Water" (Example 4.44) guitar and vocal parts form an augmented sixth chord that does not occur in any of the modes. It is often interpreted as a chromatic altered chord (e.g. Forte 1962: 356–361; Salmenhaara 1980: 317). According to the modal system the chord could be seen as a chromatic altered chord (phrII$^{\sharp 6}$). On the other hand, another interpretation could be based on enharmonic reading: Phrygian II is harmonized with a dominant seventh structure, which is one of vertical consonances (phr$\tilde{\text{II}}^{7}$).



Example 4.44. Chorus of "Smoke on the Water" with vocal harmonies.

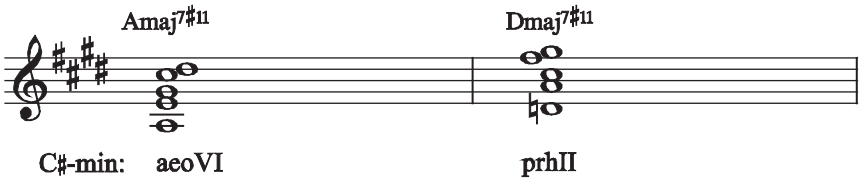
Example 4.45 shows another chord that cannot be found in any of the diatonic seven-note modes. This 7$^{\sharp 9}$ chord that includes both the major and minor thirds is especially favoured by Jimi Hendrix but also used in early heavy metal. In spite of the apparent dominant structure, the E$^{7\sharp 9}$ in "Purple Haze" is unambiguously a tonic chord. In this context it is hard to imagine it resolving to a fourth above; in other words, to interpret it as having a Dominant function.



Example 4.45. The beginning of the verse of "Purple Haze".

The $E^{7\sharp 9}$ could be interpreted as a chromatic altered chord $I^{7\sharp 9}$. An alternative reading is as follows. The four lowest tones form a vertically consonant dominant seventh structure $\tilde{I}^{7}$ that supports the fundamental E. In terms of harmonic analysis this means that, in a sense, there is only a single tone (E) that is supported by the structure arising from its harmonic series. According to this interpretation the minor third G in the pentatonic melody is supported by the guitar. This is in accordance with Jeff Todd Titon's (1977: 155) observation regarding the downhome blues scale: the major third is more frequently used in the lower and minor third in the higher octaves (see Chapters 5.1.2 and 5.1.3). The lower octave is more sensitive to the accompanying harmony.

When distortion increases, most heavy metal guitarists reject the use of chord structures that are more complex than a triad. Major triads and power chords are the standard fare of heavy metal, because, as demonstrated, with loud distortion their sound is less rough than that of other chord structures. Without distortion, however, different chord structures are used more freely. For instance, Jimmy Page, the guitar player for Led Zeppelin, has used extended tertial chords, but usually with a rather clear guitar sound. Example 4.46 presents extensions of tertial harmony in the chords of "No Quarter" (*Houses of the Holy* 1973). Both chords include a major seventh and an augmented eleventh. These kinds of chord extensions have also been used, although in a slightly different manner, by twentieth century composers (e.g. Persichetti 1965: 82–85); furthermore, they are extremely common in jazz (cf. e.g. Garcia 1954: 43).



Example 4.46. Chords preceding the main riff of "No Quarter".

It seems that these kinds of chords are used in heavy metal only when there is no or little distortion. As the level of distortion increases, the level of roughness increases; complicated structures produce more roughness than the simple ones. Eddie Van Halen comments on jazz chords:

> [T]he thing is, in rock and roll you only have so many chords. If you start hitting chords like this [plays 7ths and 9ths] in rock and roll, forget it! They have emotion, but they don't fit power rock. They're so dissonant that the vibrations of the overtones with that much distortion sound like shit. That's why most

> rock and roll songs are simple – straight major and minor chords. You start dickin' with chords like the 7ths and 9ths through a blazing Marshall and it will sound like crap. (Quoted in Obrecht 1984: 155).

Although Van Halen does not recognize the rare use of minor triads, this quote is yet another example that heavy metal guitarists are aware of the basic acoustic characteristics of their instrument. Largely because of this, the power chord is the most popular chord structure in heavy metal.

5

Melodic and Harmonic Schemes and their Relation to Other Musical Styles

> - With the publication of the first blues the materials of the twentieth-century popular composer were complete. Since then popular music has helped itself to various folk styles, taken hints from classical music, and combined existing styles in all sorts of ways. It has striven to maintain a sense of breathless novelty. But it has come up with nothing that, fundamentally, cannot be traced back to 1900 or earlier. (Peter Van der Merwe 1989: 286)

The blues is often considered as the primary source for heavy metal. For instance, Weinstein (2000: 16) argues that "heavy metal derived its basic song structure, its fundamental chord progressions, and its guitar riffs from the blues-rock tradition". However, no musical style or genre develops in isolation: "the use of existing music as a basis for new music is pervasive in all periods and traditions" (Burkholder 2009). As much as any other style of music, the melodic and harmonic practises of heavy metal are a synthesis derived from various sources. The following discussion concentrates on melodic and harmonic features heavy metal shares with other musical styles, and suggests some probable reasons for these similarities.

"Musical skill is acquired through interaction with a musical environment. It consists in the execution of some culturally specific action with respect to musical sounds." (Sloboda 1985: 194.) Even before receiving any formal training, every member of a given culture absorbs some basic cultural specific musical skills from the early age. This *enculturation* takes place without any self-conscious effort or instruction (Sloboda 1985: 196). Heavy metal musicians are no exception. Well before consciously partaking of any training in music, they have been exposed to Western musical practices in various forms of, for example, popular music, church music, Christmas carols, football chants and the

like, which are transmitted by radio, television, recordings and immediate social networks. Since all members of a culture are enculturedured to its musical practises, it is easy to account for the common musical ground that heavy metal shares with other styles of Western music. In this light it is not impossible to think that features of, for example, European art music have been rediscovered in heavy metal contexts without conscious prior knowledge.

More likely, however, is that the majority of similarities with other musical styles are due to various processes of borrowing. Ethnomusicologists have described the inter-cultural influences in terms of *acculturation*. Derived from anthropology, acculturation has three basic types: acceptance, adaptation and reaction (e.g. Herskovits 1938). In order, they refer to replacing ones culture with a new one, including some features of a new culture to ones own, or rejecting alien influences. Regarding heavy metal, some sort of adaptation seems to be an adequate starting point. A Finnish scholar Pekka Jalkanen (1989: 12–14) uses the term *cultural fusion* to refer not only to the adaptation of new influences, but also to signify a balance that is found between the old and new. From this balance a new culture is created.

Heavy metal has been a synthesis of different musical styles from the start. Most of the early heavy metal musicians were skilled professionals in a variety of styles of popular music well before they formed the groups in which they came to be knownps. For instance, Jimmy Page, John Paul Jones, Ritchie Blackmore and Tony Iommi were accustomed to playing Motown as well as rock 'n' roll classics (see Chapter 2.3.2.). Willingly or not, through these influences, early heavy metal incorporated features of major/minor tonal music and the blues. In this regard cultural fusion seems to be a more appropriate description of the process than simply adaptation of foreign influences.

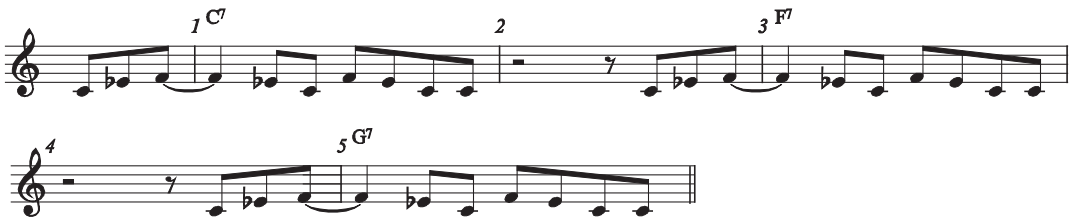
A significant part of the cultural fusion may be more intuitive than intentional. However, there are examples that clearly show the intentional fusion of various musical styles with the tonal language heavy metal. For instance, the classically trained organist Jon Lord of Deep Purple used to "pluck a classical thing out and turn it around in the same way Ritchie [Blackmore] was turning around Hendrix riffs and make that his own" (bass player Nick Simper quoted in Bloom 2006: 102). The following will address some distinctive features and instances of cultural fusion in heavy metal.

5.1. Influence of the Blues

5.1.1. Riffs

> A riff is a short repeated melodic fragment, phrase or theme, with a pronounced rhythmic character. Riffs can be played by any combination of instruments and can be spontaneously improvised or pre-composed. A riff may be repeated unchanged or it can be altered to fit the harmonic changes of a song. (Washburne and Fabbri 2003: 592).

Riffs are often thought to be of African origin and especially important in African-influenced styles such as the blues, jazz and rock & roll (e.g. Washburn & Fabbri 2003: 592; cf. Oliver 2005). Riffs may be unaffected by the underlying harmony (as in Example 5.1), thus having similar characteristics to the *ostinato* practice of Western art music since the 13th century (e.g. Schnapper 2006).



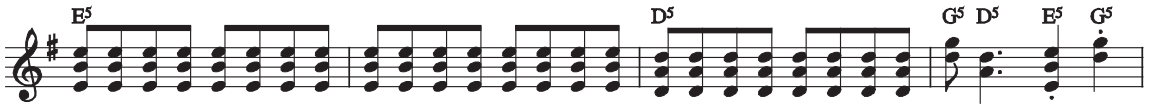
Example 5.1. An ostinato riff after Schuller 1968: 48.

In jazz music riffs served first as a background element and later on as foreground material, especially in the later Swing Era (Schuller 1968: 48). One of the most well-known riff tunes is Glenn Miller's "In the Mood" (Washburn & Fabbri 2003: 592). Downhome blues artists such as Robert Johnson frequently applied guitar riffs as definite foreground elements; one of the most famous is the riff to "Cross Road Blues" (1936; *The Complete Recordings* 1996). This along with many others were used and arranged by blues rock bands of the 1960s such as Cream (see Headlam 1997), in this way setting the basic framework for riff-based heavy metal.

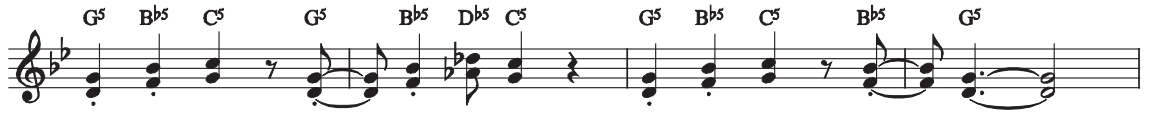
> [The] procedure of extracting or arranging motivic figures or riffs from blues songs and using them repeatedly within a simplified and regularized harmonic and metric framework is characteristic of Cream and other rock bands. The practice continued in the later band Led Zeppelin and beyond, when such riffs, now newly composed, became a staple of heavy metal. The development of riff-based blues-rock, in which the complex rhythmic and melodic patterns of the

> earlier country and electric blues solo styles are simplified and evened out in a rock group setting, is an essential aspect of the transformation from blues to rock music. (Headlam 1997: 71.)

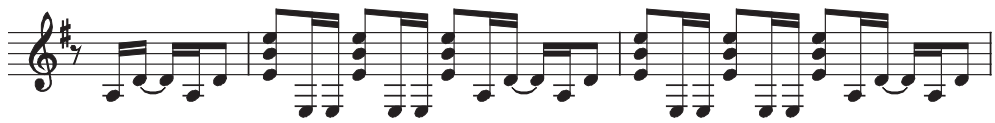
Melodic/harmonic patterns or riffs, which usually measure two or four bars, are of fundamental importance to heavy metal. Probably the most famous heavy metal guitar riffs are those from Black Sabbath's "Paranoid" (*Paranoid* 1970), Deep Purple's "Smoke on the Water" (*Machine Head* 1972), both measuring four bars, and Led Zeppelin's "Whole Lotta Love" (Led Zeppelin II, 1969) measuring one bar (Examples 5.2 through 5.4).



Example 5.2. Riff to Black Sabbath: "Paranoid".



Example 5.3. Riff to Deep Purple: "Smoke on the Water".

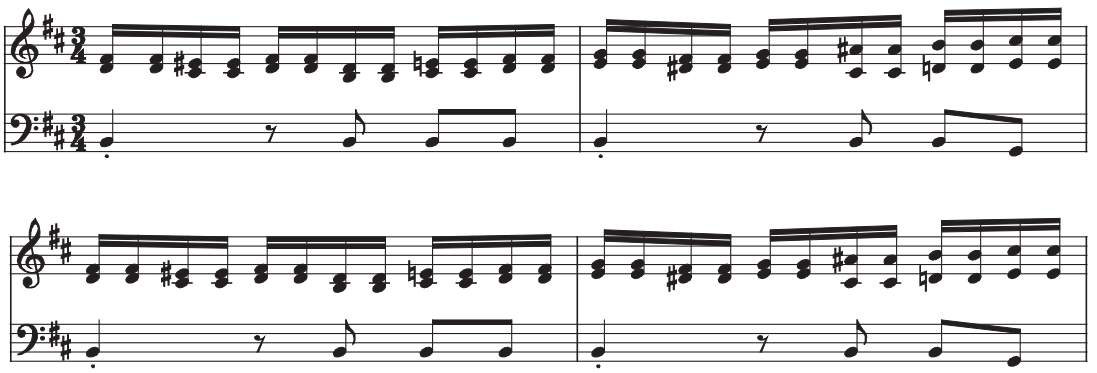


Example 5.4. Riff to Led Zeppelin: "Whole Lotta Love".

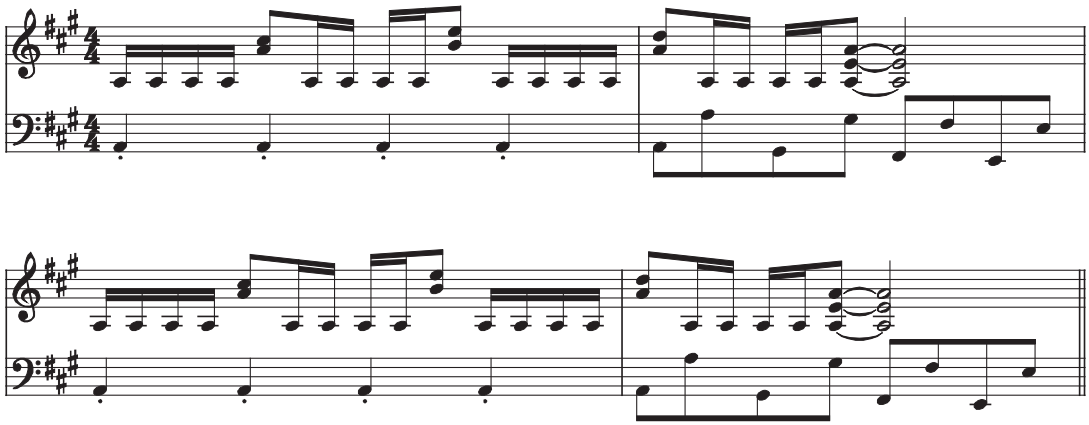
Even though riffs are usually linked to popular styles such as the blues and boogie-woogie (e.g. Piston & DeVoto 1987: 94–95), it is not difficult to find similar practices in European art music. In art music, such short patterns are usually in terms of motifs (e.g. Schoenberg 1967: 8–15). Unlike most heavy metal riffs, motifs in the classical repertoire are usually not as stable and unchanging. Instead, they serve as basic building blocks for melodic and harmonic development within a piece. For instance, W. A. Mozart's Symphony No. 25 in G minor starts with a four bar riff-like motif, which in various forms appears throughout the first movement, creating a sense of coherence and unity for the whole. Arnold Schoenberg (1967: 8) says that "a motive appears constantly throughout a piece: *it is repeated*. Repetition alone often gives rise to *monotony*. Monotony can only be overcome by *variation*." Riffs in heavy metal are usually

stable and repeated unchanged. Although they have a role of bringing continuity in musical structure, they, as Schoenberg says, give rise to monotony. This monotony is, however, an important part of the aesthetics of heavy metal, much in the same sense as repetitive patterns are in the *rondo* forms of the classical repertoire.

The main theme of Franz Schubert's (1797–1828) Symphony No. 8 in B minor ("Unfinished") has a very guitar riff-like accompaniment in the *divisi* violins (Example 5.5). Unlike some other motifs in the composition, this pattern is not subject to significant development. Rather, it serves as an accompaniment for the main theme in this section. The style of accompaniment has striking similarities with Ozzy Osbourne's "Crazy Train" (*Blizzard of Ozz* 1981), which presents a rather similar usage of a repetitive pattern (Example 5.6). These kind of accompaniment patterns can be found also in other compositions of the art music repertoire; for example, in Mozart's Symphony No. 40 in G minor, 1st movement, and Anton Bruckner's (1824–1896) Symphony No. 3 in D minor, 1st movement.



Example 5.5. The divisi violins and the bass part accompanying the main theme of Schubert's Symphony No. 8 in B minor, 1st movement (mm. 9–12).



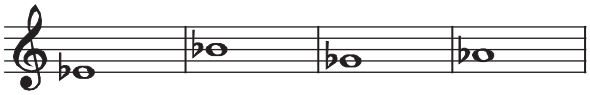
Example 5.6. The guitar riff and the bass part to "Crazy Train" (verse) in A major.

Even though repetition and monotony are most obviously inherited from the blues and, furthermore, from psychedelic rock to heavy metal, the influences of European art music can not be neglected. Although the motifs of, say, Mozart and Schubert usually develop over the course of a movement, they are usually most memorable at their first and most simple appearance in the composition. Thus, through conscious or unconscious acculturation, this kind of motifs can be thought as having influenced the construction of heavy metal riffs.

5.1.2. Scales and Modes

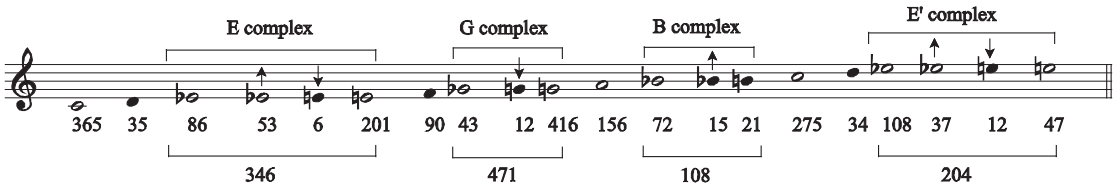
As heavy metal is a subgenre of rock, its roots are largely in rock 'n' roll; rock 'n' roll has its origins in rhythm & blues, and rhythm & blues in the blues (e.g. Wagner 2003: 353). "[H]eavy metal guitarists who did not study the blues directly learned secondhand, from the cover versions of Eric Clapton and Jimmy Page or the most conspicuous link between heavy metal and blues and r&b, Jimi Hendrix" (Walser 1993: 58). Hence, it follows that one could expect to find in heavy metal some elements that originate from the blues. "All blues tunes have two things in common: one is syncopation, and the other is a mode, which is in fact not merely a mode, but a particular kind of modality, dominating and controlling the whole style in much the same way as a particular kind of tonality dominates the Classical style" (Van der Merwe 1989: 18). Peter Van der Merwe (1989: 118) explains the blues mode as a "model frame: that is, a framework of melodically significant notes interspersed with less important ones". The "important" notes are the so-called blue notes that, in a classical sense, may be major, minor or something in between; in the cases where there

is microtonal variation one often speaks of them being "neutral". The most usual blue scale steps are the third, the seventh, the fifth and the sixth. Blue notes often occur in major contexts as slightly lowered degrees, and are often notated as if they were minor intervals (Example 5.7).



Example 5.7. The basic blue notes against the tonic C (after Van der Merwe 1989: 119).

Jeff Todd Titon (1977: 155) has differentiated between various blue notes. In his study of 44 downhome blues tunes he counted the occurrences of different pitches and formed the so-called "downhome blues scale". In Titon's blues scale blue notes are differentiated not by the usual semitones, but more specifically by quarter tones (Example 5.8). The figures below the staff indicate the number of occurrences of different pitches. Titon's study show, for example, that the use of the third scale step is different in the lower octave (E complex) and the higher octave (E' complex).

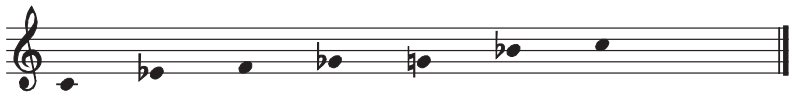


Example 5.8. Downhome blues scale (after Titon 1977: 155).

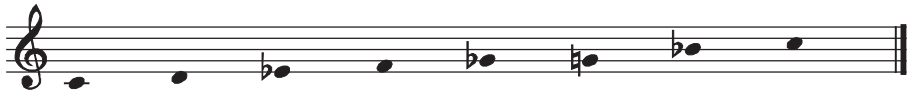
"All the components of the blues mode are to be found somewhere in West Africa, but separately, awaiting assembly in American soil" (Van der Merwe 1989: 131). In addition, elements of the blues mode can be found in European folk and art music traditions too (ibid: 171–183). For instance, English folk-singers apparently made little modal distinction of minor, major, and neutral thirds; furthermore, in English folk song "melodically important thirds and sevenths […] usually take the minor form" (ibid: 171–172).[18] In notated popular music the various forms of the blues mode have been simplified into a number of artificial blues scales. One of the most common is presented by Wolf Burbat (1988: 115). This is a minor pentatonic scale with the inclusion of a diminished

18. The development and specific features of the blues mode are discussed in length by Merwe (1989).

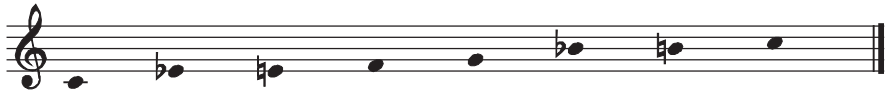
fifth (Example 5.9); a variation includes the major second degree (Example 5.10). Sometimes different forms of thirds and sevenths are included and the diminished fifth is left out (Example 5.11).



Example 5.9. Blues scale no. 1 (after Burbat 1988: 115).

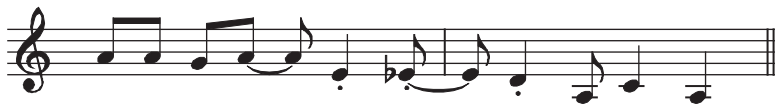


Example 5.10. Blues scale no. 2 (after Iron Maiden Guitar Tab Edition 1994).

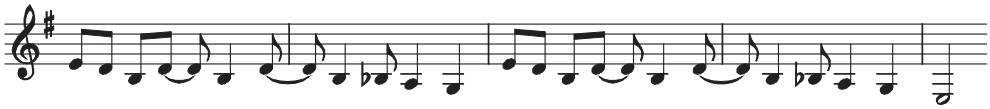


Example 5.11. Blues scale no. 3 (after Schuller 1968: 45).

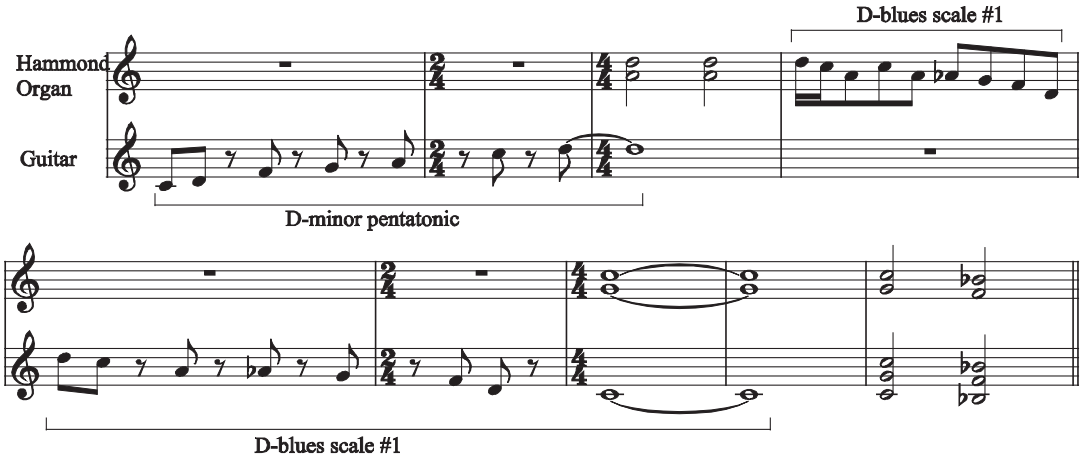
The aforementioned blues scale variations occur in different ways in heavy metal compositions. The last example addressed here as "blues scale no. 3" appears in heavy metal through cross relations, which are discussed later. The most common is with no doubt the blues scale number 1. Examples are numerous: for instance, the famous blues rock riff of Cream's "Sunshine of Your Love" (*Wheels of Fire* 1968) that was with no doubt very influential on heavy metal guitarists, is based on this particular scale (Example 5.12). So is the ending riff to Iron Maiden's "Wrathchild" (*Killers* 1981) (Example 5.13). In the transitional section from the organ solo to the verse to Deep Purple's "Highway Star" (*Made in Japan* 1972) the organ replies with a descending D-blues scale to the guitar phrases that are built on an ascending D minor pentatonic and descending D-blues scale (Example 5.14). Furthermore, blues scales are the main building blocks of numerous guitar and organ solos throughout the 1970s.



Example 5.12. Simplified guitar riff to Cream: "Sunshine of Your Love" (tonic A).

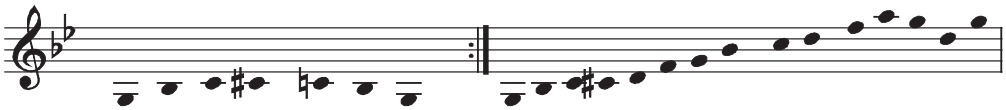


Example 5.13. Ending guitar riff to Iron Maiden: "Wrathchild" (tonic E).



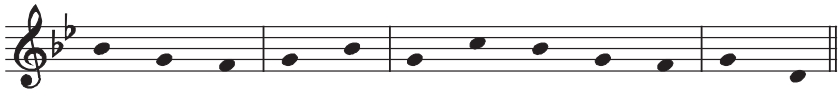
Example 5.14. Guitar and organ part to Deep Purple: "Highway Star" (transition after organ solo).

An excerpt from Black Sabbath's instrumental piece "Rat Salad" (*Paranoid* 1970) shows a riff that applies blues scale number 2; near to the end there is an occurrence of the second degree note A (Example 5.15).

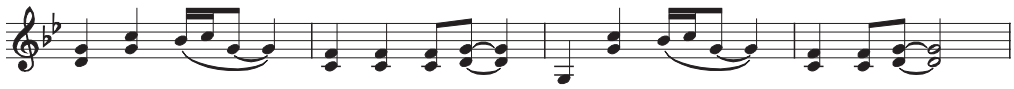


Example 5.15. Reduction of the main riff to Black Sabbath: "Rat Salad".

Another resemblance to the blues is the use of pentatonic scales – blues-derived pentatonicism is especially important in early heavy metal, although some of its influence has remained in later metal. Minor forms are especially important in the use of pentatonic structures. The G minor pentatonic vocal melody in Deep Purple's "Speed King" (*In Rock* 1970) gives an example of this (example 5.16). In addition, riffs such as in Rainbow's "Long Live Rock 'n' Roll" (*Long Live Rock 'n' Roll* 1978) are frequently constructed on a minor pentatonic scale as (Example 5.17).

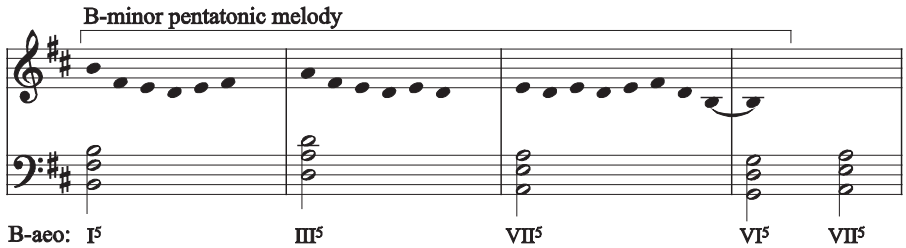


Example 5.16. Reduction of the vocal melody for the verse of "Speed King".



Example 5.17. An excerpt of a pentatonic riff in "Long Live Rock 'n' Roll" (ca. [0:03–0:10]).

Pentatonic vocal melodies are important to later Deep Purple, too. In "Knocking at Your Backdoor" (*Perfect Strangers* 1984) the melody is clearly pentatonic (Example 5.18). However, with the chords included, the overall melodic-harmonic environment is closer to an Aeolian scale. This is one example of how pentatonic melodies can occur in harmonic environments that are derived from a different source. Putting blues, jazz and rock under a single label "Afro-American music", John Shepherd (1991: 129, 131) states that "many Afro-American melodic lines seem to be pentatonic". As the following shows, however, there are other musical characteristics in heavy metal that are at least as important as those derived from pentatonicism. While Shepherd's notion might be true in general, it is very simplistic with regard to heavy metal.



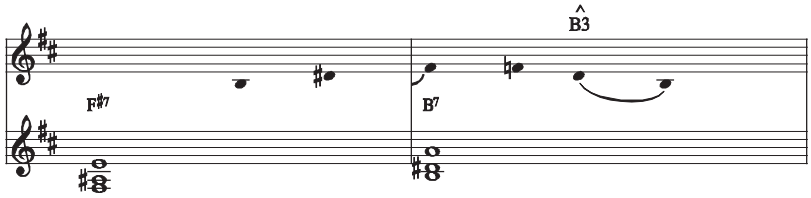
Example 5.18. Reduction of the first four bars of the verse of "Knocking at Your Backdoor".

5.1.3. Mixtures of Major and Minor

It has been argued that since the 1970s heavy metal has had little to do with the blues (e.g. Moore 2001: 148; cf. Kahn-Harris 2007: 30). However, the use of power chords in heavy metal serves as a link between heavy metal and the blues. The development of the accompaniment style is clarified by the following examples from different time periods ranging from downhome blues to heavy

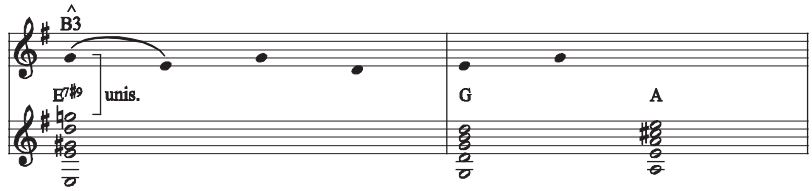
metal (Examples 5.19 though 5.21). The blue thirds are indicated with a label B$\hat{3}$ (after Martin 1996: 22–23).

From its early days, it was customary in blues to accompany the minor third in a melody with a chord containing the major third (a similar procedure was common in sixteenth and the seventeenth century European art music; see Van der Merwe: 1989: 174–177). Example 5.19 shows a "primary blues chord" (Wagner 2003: 354), i.e. the dominant seventh chord, with the minor third in the melody in Robert Johnson's "Kind Hearted Woman Blues" (1936, take one, *The Complete Recordings* 1996). Lyrics for the excerpt are: "I've got a kind hearted woman." This idiom was later on adapted by rock & roll, pop, and rock artists such as Chuck Berry in "Sweet Little Sixteen" (1954) (cf. Van der Merwe 1989: 177), and by the Beatles in numerous songs (cf. Wagner 2003).



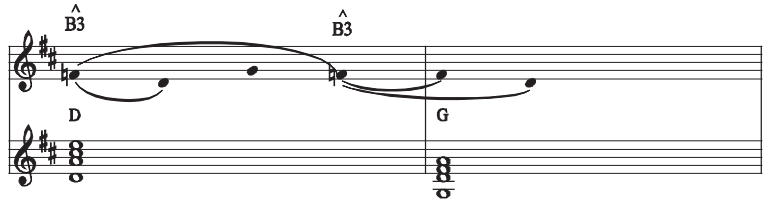
Example 5.19. Reduction of the first vocal phrase and harmony in "Kind Hearted Woman Blues".

Example 5.20 shows a chord that includes both the major and the minor thirds. Chord symbol notation usually applies an enharmonic reading for the minor third (augmented ninth, e.g. E7♯9). In this example there is Jimi Hendrix's "Purple Haze" (1967; *The Singles Album* 1983) with a three-note melody for the lyrics: "purple haze is in my brain". The E7♯9 chord may be said to be supporting the minor third in the melody in the same way that the chord's minor third G is a part of the minor pentatonic scale of the melody; in other words the guitarist supports the melody with his instrument. This is in agreement with Titon's (1977: 155) observation regarding the downhome blues scale: the major third is more frequently used in the lower and minor third in the higher octaves (see Example 5.8). The lower octave is more sensitive to the affect of the accompanying harmony. This structure is also exploited by the Beatles in "Helter Skelter" (*White Album* 1968), and Tony Iommi of Black Sabbath in, e.g. "Supernaut" (*Vol. 4* 1972). Furthermore, the same structure was also favoured by composers of art music such as Béla Bartók (e.g. Honti 2006: 60–61).



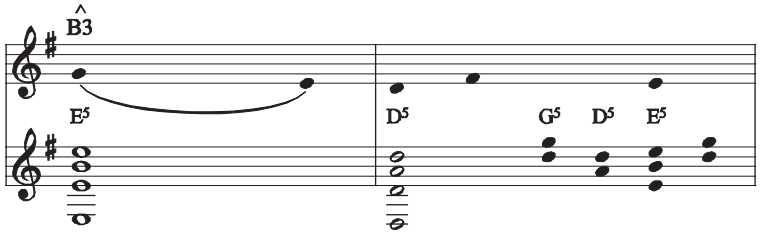
Example 5.20. Reduction of the first vocal phrase and harmony in "Purple Haze".

Example 5.21 shows a minor third against a major triad. This is used, for instance, by the Beatles in "The Night Before" (*Help!* 1965; cf.Wagner 2003: 359). Lyrics in this example are: "treat me like you did the night before". (In relation to the G major chord in the second bar the F may also be read as a blue seventh.) Other uses of this idiom include "Back in the U.S.S.R." by the Beatles (*White Album* 1968), and "Crossroads" (*Wheels of Fire* 1968), Cream's version of Robert Johnson's 1936 "Cross Road Blues" (cf. Headlam 1997: 70).



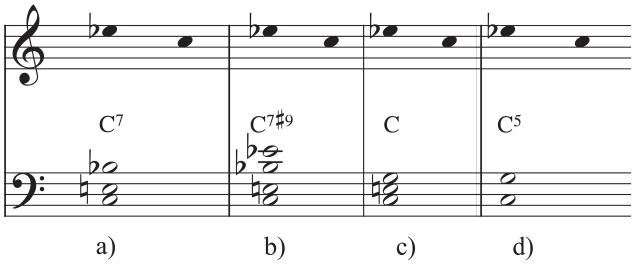
Example 5.21. Reduction of the first vocal phrase and harmony in "The Night Before".

Example 5.22 shows a minor third accompanied by a power chord. It has been used, for instance, by Black Sabbath in "Paranoid" (*Paranoid* 1970) for the lyrics: "finished with my woman 'cause she couldn't help me with my mind". Other examples include the refrain section of Iron Maiden's "Running Free" (*Iron Maiden* 1980), and Deep Purple's "Black Night" (*Made in Japan* 1972 and *Singles – A's & B's* 1988). However, in heavy metal music from the early 1970s to the present, examples are numerous.



Example 5.22. Reduction of the first vocal phrase and harmony in "Paranoid".

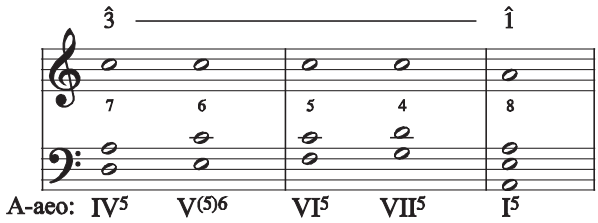
It may be argued that the popularity of the power chord is due to its open nature. Hence, it can be used for harmonizing both the major and minor thirds. However true this may be, it may also be argued that due to its fundamentally major quality (as discussed in Chapter 4), the power chord in minor mode contexts produces a mixed triadic quality, which suggests a similarity with the harmonic/melodic practices of the blues. Example 5.23 shows the excerpts discussed above as transposed so that they all have a common central tone.[19]



Example 5.23. Melodic progression from the minor/blue third to the tonic harmonized by a) Robert Johnson, b) Jimi Hendrix, c) The Beatles, and d) Black Sabbath.

In addition, Examples 5.23a-d present a melodic motion from the minor (or blue) third to the tonic (marked with slurs in Examples 5.19 to 5.22). Such motions are quite idiomatic in blues melodies (see Titon 1977: 155). This motion is also an important feature in blues-jazz (Martin 1996: 22–23), and it is not uncommon to heavy metal. For instance, one occurrence of the bridge section in Judas Priest's "The Sentinel" (*Defenders of the Faith* 1984) includes a similar melodic motion from the minor third degree to the first. However, as Moore (2001: 150) states, in heavy metal there is "a strong preference for [equal] tempered pitch" (Example 5.24).

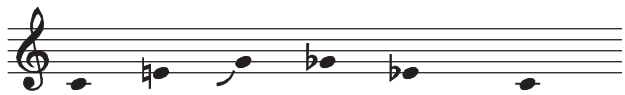
19. Since the blues, pop/rock and heavy metal often use melodic/harmonic content other than that traditionally discussed in terms of "keys", it is more relevant in this context to speak about "central tones" (i.e. "tonics") than about "keys".



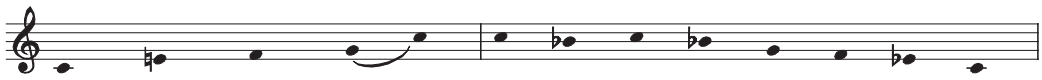
Example 5.24. Melodic motion from the minor third to the tonic in Judas Priest: "The Sentinel".

The vocal melody in Robert Johnson's "Kind Hearted Woman Blues" (1936; *Complete Recordings* 1996) presents an interesting case regarding the use of blue thirds. When ascending the third is near to major, and when descending, near to minor (Example 5.25). Black Sabbath's "War Pigs" (*Paranoid* 1970) appears to exploit quite a similar idea, although in more tempered pitch (Example 5.26). "War Pigs" also presents a mixture of two different scales: a major scale when ascending and a minor pentatonic scale when descending.

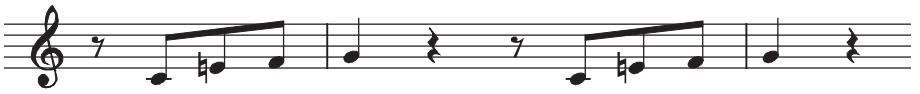
Furthermore, the ascending vocal phrase of "War Pigs" has a striking resemblance with a gospel classic "When the Saints Go Marching In" (Example 5.27), which in turn seems to appear in Iron Maiden's "The Number of the Beast" (*The Number of the Beast* 1982) for the guitar riff and vocal melody (Example 5.28). It is impossible to say whether this kind of borrowing is conscious or whether it arises unconsciously from the previously heard material. However, these kinds of patterns and idioms are common material in heavy metal compositions. The examples are transposed to the same pitch for easier comparison.



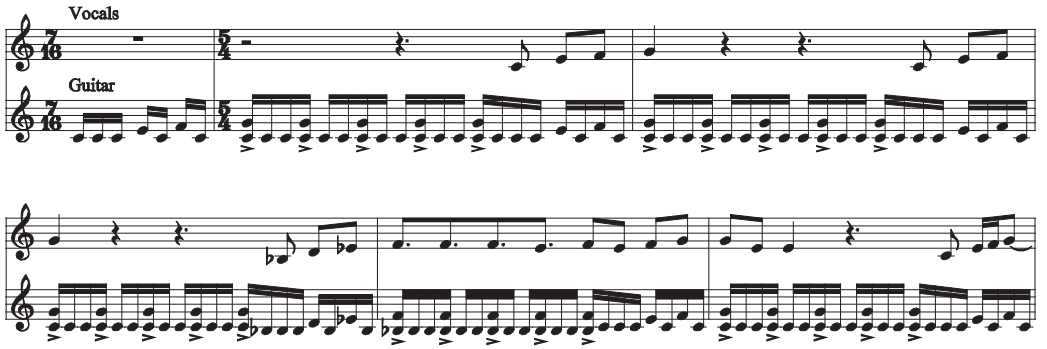
Example 5.25. First vocal phrase of "Kind Hearted Woman Blues" (original tonic B-flat).



Example 5.26. Ascending and descending vocal melody in "War Pigs" (original tonic E).

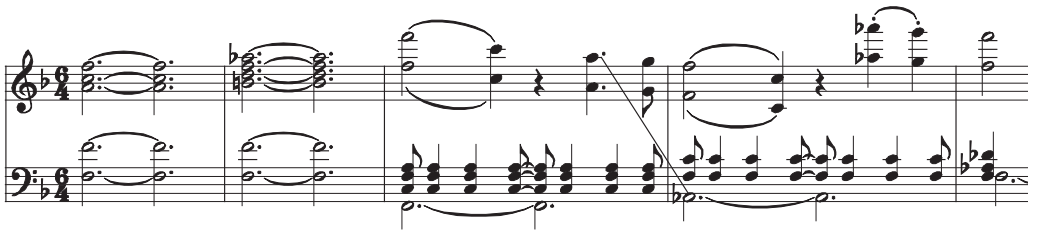


Example 5.27. The beginning phrase of "When the Saints Go Marching In".



Example 5.28. "The Number of the Beast" (original tonic D).

Many of the examples above apply a mixture of major and minor modes via the use of both thirds of the key. These kinds of modal mixtures are not limited to the blues or heavy metal. "The breakdown of the major minor distinction appears […] when the two modes are on the same tonic.[…] The tendency is actually most marked among 'serious' composers like Beethoven, Schubert, and Brahms […]" (Van der Merwe 1989: 255–256). In this regard, "Purple Haze" (Example 5.20) has a similar modal ambiguity to the main theme of Johannes Brahms' 3rd symphony (Example 5.29). The cross relation of the melody in m. 3 and the bass in m. 4 resembles the progression from E7♯9 to the G major in "Purple Haze". Due to the way in which major, minor and blue thirds are treated, cross relations are common in blues, blues rock and heavy metal.



Example 5.29. Cross relation in Brahms' Symphony No. 3, Op. 90, I (mm. 1–5) (piano arrangement after Aldwell & Schachter 1989: 365).

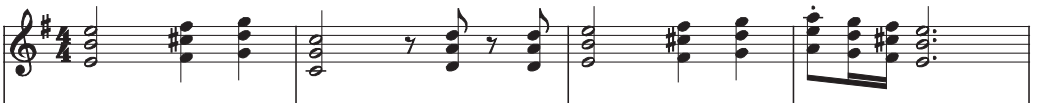
5.2. Modal Influences

5.2.1. Church Modes

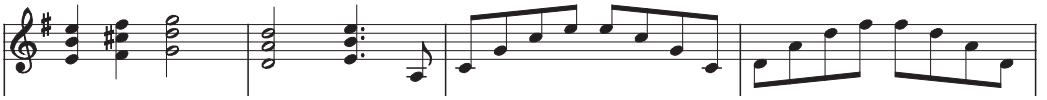
Mode "has always been used to designate classes of melodies, and since the 20th century to designate certain kinds of norm or model for composition or improvisation as well" ("Mode" 2003; cf. Tagg 2003d: 552–555). Despite originating in the history and theory of European music, the mode is also a modern musicological concept that has been applied to non-Western music since the late 18th century (Powers & Wiering 2004a; Powers & Widdess 2004; cf. Pennanen 1999: 42–44). For example, composers in the Western art music canon (e.g. Beethoven, Schumann, Chopin, Liszt, Bartók, and Debussy) have made use of various modal concepts (e.g. Porter 2004). Modal influences were derived either from various folk music traditions or from church modes. In modern Western music "mode" usually refers to the so-called church modes, i.e. the seven heptatonic scales that were derived from the original modes of Gregorian chant (see Tagg 2003d: 553). Some have placed the church modes in a transitional stage from pentatonic systems towards the major and minor modes of the common practise era of Western tonal music (see e.g. Shepherd 1991: 96–107). John Shepherd (1991: 102–105) argues that church modes were developed by the inclusion of weaker melodic tones to different pentatonic scales. In Western art music since the early eighteenth century (see Riemann 1977: 162–163) there have been only two common modes – the major and the minor (e.g. Harrison 1994: 17; Salmenhaara 1980: 197). However, the modes used in heavy metal vary much more widely. Melody and harmony in heavy metal are more often built according to modal scales than, for example, the major/minor system of Western art music. Since the 1970s many guitar players have become familiar with modal scales through various music theory books such as *Thesaurus of Scales and Melodic Patterns* by Nicolas Slonimsky (1947; cf. Walser 1993: 65–66). Furthermore, heavy metal musicians became familiar with modal scales as a compositional and improvisational tool through various guitar magazines (see e.g. Whitehill 1989; Walser 1993: 65–66). Modal influences can be seen, for example, in the importance of chord progressions that move in thirds and seconds, and in the extended usage of the "flattened" seventh degree (see e.g. Moore 1995). According to Walser (1993: 46), the most common modes in heavy metal are Aeolian and Dorian; speed metal is usually Phrygian or Locrian, and most pop songs are Ionian or Mixolydian (cf. Moore 1992). The following examples illustrate some common uses of church modes in heavy metal.

Most Black Sabbath riffs are constructed with power chords built on Aeolian scale degrees (Examples 5.30 through 5.32). Interestingly enough, Black Sabbath's use of the Aeolian mode for these riffs resembles the introductory

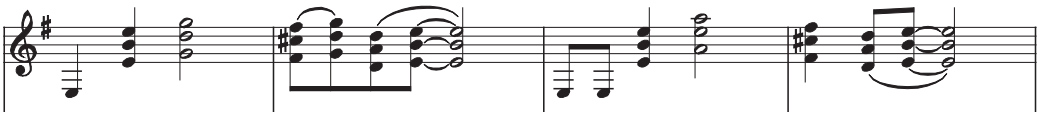
theme in Schubert's Symphony no. 8 that may be understood as B-Aeolian (Example 5.33). The main difference between Black Sabbath and Schubert here is that Black Sabbath's riffs are repeated constantly and unchanged, whereas Schubert's theme serves as a starting point for motivic development of the 1st movement. Furthermore, Black Sabbath applies parallel fifths whereas Schubert applies only parallel octaves (in cellos and double-basses). However, as discussed in Chapter 4, harmonic structure of power chord supports chord root in a way that makes it comprehensible as a single unit. In other words, a power chord riff may often be regarded as a single melodic line.



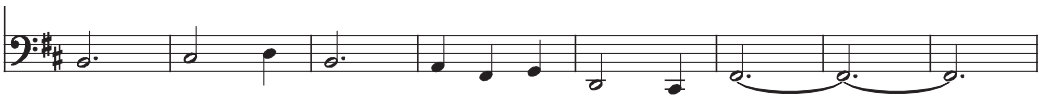
*Example 5.30. Guitar riff to Black Sabbath: "Heaven and Hell" (*Heaven and Hell *1980).*



*Example 5.31. Guitar riff to Black Sabbath: "Snowblind" (*Vol. 4 *1972).*



Example 5.32. Guitar riff to Black Sabbath: "Sign of the Southern Cross" (Mob Rules 1981).

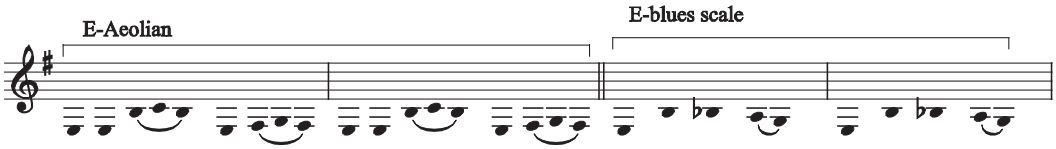


Example 5.33. Introductory theme in Schubert's Symphony no. 8, B minor, 1st movement (mm. 1–8) (doubled one octave below).

Besides European concert music, the Aeolian mode may also have been transmitted to heavy metal through the American folk revival of the 1960s, and subsequently through folk rock. For instance, Joan Baez used an Aeolian I-VI-IV-VII-I progression in "Diamonds and Rust" (*Diamonds & Rust* 1975), which was soon adopted with slight modifications in Judas Priest's arrange-

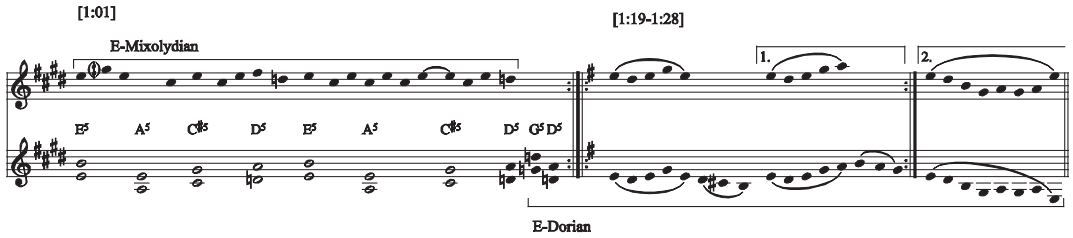
ment of the piece (*Sin After Sin* 1977). Another case is the Aeolian I-VI-VII-I in, for example, Bob Dylan's "All Along the Watchtower" (*John Wesley Harding* 1967); Jimi Hendrix's version is especially noteworthy. This formula has gained a degree of importance in heavy metal similar to I-IV-V-I in major/minor tonal music. For instance, most Iron Maiden compositions are based on it. Whether these cadences are originally derived from folk or art music remains unclear; still, they serve as examples of cultural fusion in heavy metal.

Example 5.34 shows Black Sabbath's "Electric Funeral" (*Paranoid* 1970). An E-Aeolian introductory riff is followed by a verse built on an E-blues scale; this is an example of two different scalar/modal contents being mixed.

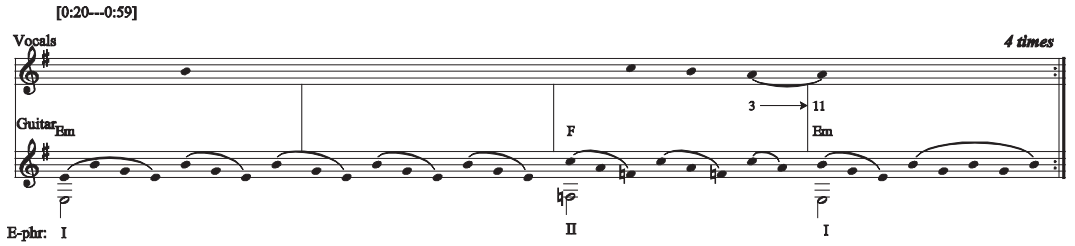


*Example 5.34. Reduction of an Aeolian riff alternating with blues scale guitar/vocal riff in "Electric Funeral" (*Paranoid *1970).*

Furthermore, Iron Maiden alter E-Mixolydian and E-Dorian modes for the verse and refrain in "Murders in the Rue Morgue" (*Killers* 1981) (Example 5.35). The Mixolydian verse is accompanied with repeated pattern I-IV-VI-VII. The flat third degree G5 serves as a transitional chord (in a cadence with D5) into E-Dorian. Modes are sometimes classified according to their third scale degree (cf. Tagg 2003d: 553).-From this point of view the alternation between these two modes resembles the common-practise use of parallel keys of major and minor. However, the third and the sixth degree of the Mixolydian vocal melody are not in precisely tempered pitch; the "major" third falls in between the major and minor third (marked as a quarter tone sharp G in parentheses); the major sixth is slightly more sharp (although the difference here is very small and not marked in any special way). Thus, these notes are related to blue notes. On the other hand, the verse of "Remember Tomorrow" is undeniably E-Phrygian (Example 5.36), with chords alternating between the first and the second degrees. An interesting feature is that the vocals remain on the fourth degree, instead of a chord tone for the final Em chords, thus forming an unresolved eleventh.



Example 5.35. Mixolydian and Dorian modes in Iron Maiden: "Murders in the Rue Morgue" (Killers 1981). Vocal (top staff) and guitar part for the first verse and refrain.

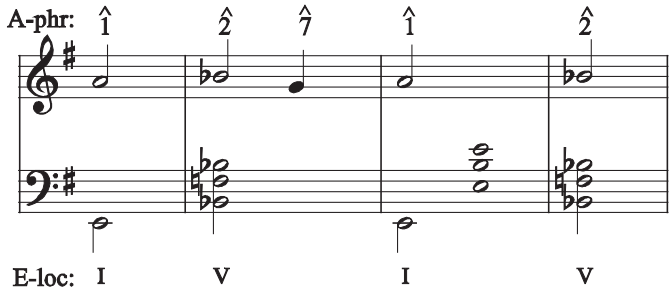


Example 5.36. Phrygian mode in Iron Maiden: "Remember Tomorrow" (Iron Maiden 1980).

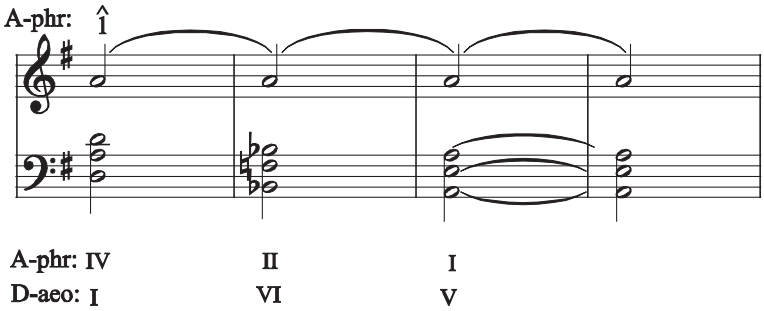
Different modes may also act simultaneously. At first glance, the main guitar riff of Black Sabbath's "Symptom of the Universe" (*Sabotage* 1975) appears to be Locrian (Examples 5.37 and 5.38). Influenced by Black Sabbath, Locrian riffs are also important for a great deal of more contemporary heavy metal. For example, in almost every piece in Metallica's *…And Justice for All* (1988) and Mercyful Fate's *Dead Again* (1998) the use of the Locrian mode is normative.

"Symptom of the Universe" is an interesting example; the harmonic background established by the guitar riff is clearly E-Locrian, but the vocal melody seems to be A-Phrygian. The next section (Example 5.38) seems to decide in favour of A-Phrygian with a cadence similar to that used in "Smoke on the Water". It may even be heard in D-Aeolian due to the semitone relationship familiar from classical minor modes between the VI and V. Still, the melody seems persistently to rely on A-Phrygian – at least I hear it that way. It may be said that "Symptom" even creates a sort of a polymodal effect. For some this might be a proof that this type of analytical method cannot be relevant to this kind of music. However, I suggest that this type of analysis can offer invaluable insights into the organising musical structures that may, at face value, seem very simple, but are often far more complex.

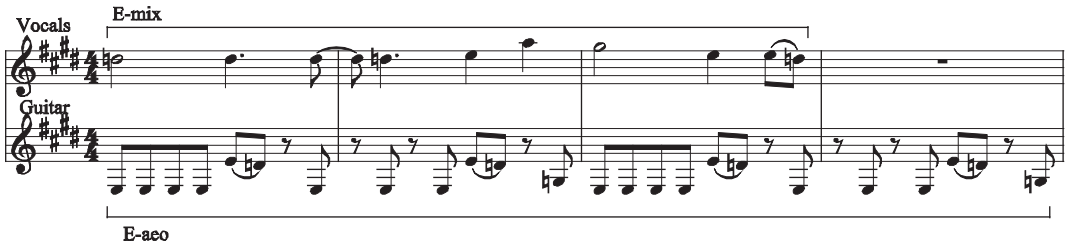
Black Sabbath's "War Pigs" is an interesting example of the simultaneous use of two separate modes, and at the same time, an example of a cross relation between the guitar riff and the vocal melody. The guitar outlines E-Aeolian with a minor third, whereas the vocals are E-Mixolydian including a major third (lyrics: "politicians hide themselves away") (Example 5.39).



Example 5.37. Reduction of the verse of "Symptom of the Universe". Vocal melody is on the upper stave, guitar chords on the lower; repeated four times.



Example 5.38. Chords following Example 5.37; repeated twice until reintroducing Example 5.37.



Example 5.39. Guitar and the vocal part in "War Pigs".

5.2.2. Pseudo-Oriental Modality

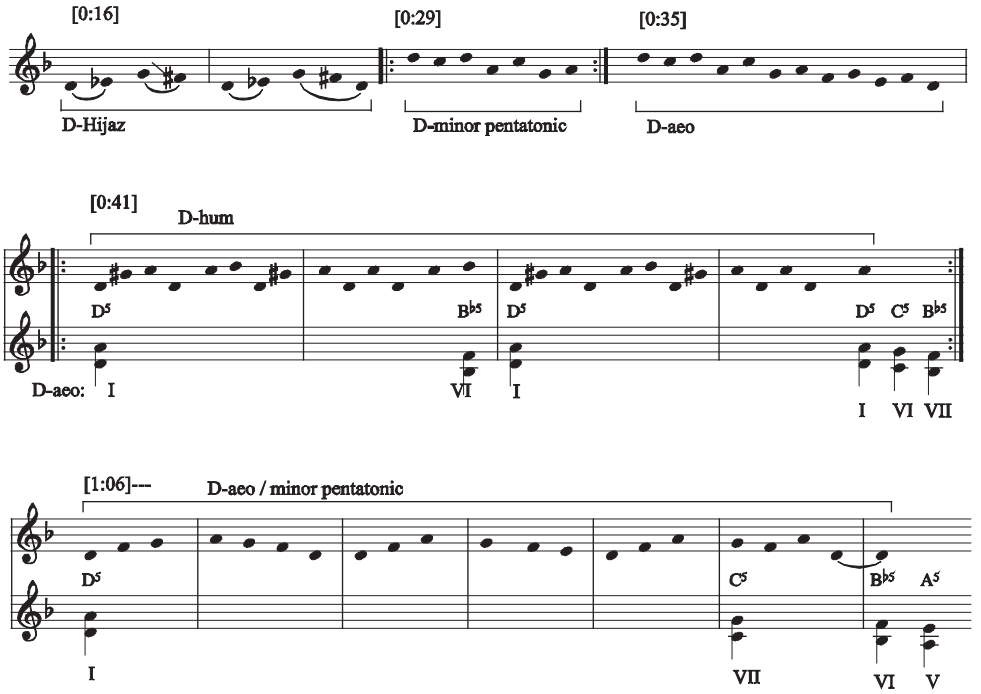
Another modality type of particular interest is the use of modal systems that are of oriental origin. Western music has continuously made use of different cultures considered "exotic". This kind on orientalism is often associated with opera; from the 18th century onwards growing immigration and European colonialism contributed to the increasing use of exotic elements (e.g. Locke 2007). Some examples of Middle Eastern influences from different time periods are Mozart's *Die Entführung aus dem Serail* (1782), Verdi's *Aïda* (1871) and Richard Strauss' *Salome* (1905); on the other hand, Puccini's *Madama Butterfly* (1904) is set in the Far East. In opera it is easy to evoke Eastern cultures with extra-musical elements such as stage setting, wardrobe, and libretto (for orientalism in opera, see e.g. Lindenberger 1998: 160–190). However, since the Viennese classics, oriental references have also been made in instrumental music as well. This presents itself as different musical gestures that were thought as being, for example, of Turkish, Hungarian or gypsy origin (see Szabolcsi 1965: 134). The aim was, however, not to copy but rather to suggest, for example, Turkish music (cf. Pirker 2007). Oriental sounding elements were incorporated in and adjusted for Western music. For instance, various musical scales that were thought of as oriental are, when adjusted for Western scale systems, unavoidably changed from the original. Most of the time, oriental elements should not be thought as authentic representations of Eastern cultures, but rather suggestive of them. For example, many Viennese 18th century compositions *alla turca* (e.g. Mozart's Piano Sonata in A major, KV 331 [300i]) have, in the end, little to do with authentic Turkish music. Piano music in general is offers especially fine examples of how elements derived from other scale systems are transformed when adjusted to tempered systems. Examples are numerous and include, besides composers of the Classical and Romantic eras (such as Mozart, Haydn, Beethoven, Schubert and Brahms), impressionists and others from the turn of the 20th century such as Debussy (e.g. *Deux arabesques*, ca. 1890) and Erik Satie (e.g. oriental sounding scales in *Trois Gnossiennes*, 1890–1893).

Musical orientalism may be divided into distinct eras, the first of which was formed by the Viennese classical composers who looked to influences that arose through multicultural immigration. The second era may be put roughly around the Paris 1890 world fair that, in the height of European colonialism, presented many Eastern cultures to the West. The third rise of the orient positions itself in the late 1960s and is associated with the hippie movement and ideologies; apart from free love and mind expanding substances, a distinct feature of the hippie movement was the appreciation of Eastern, mystical cultures paralleled with New Age religions. Many bands and musicians exploited Eastern references in extra-musical and musical contexts just as their predecessors

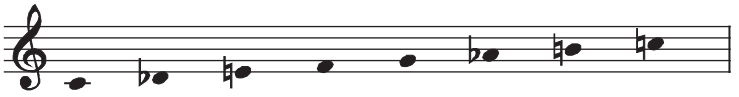
did in the two earlier eras of orientalism. For instance, the Beatles' occasional use of oriental scales and instruments is well documented (e.g. *tambura*, *sitar* and *tabla*) (e.g. "Tomorrow Never Knows" from *Revolver* 1966, and "Within You, Without You" from *Sgt. Pepper's Lonely Hearts Club Band* 1967). Being exposed to Indian music, especially Ravi Schankar in the Monterey Pop festival, Jimi Hendrix frequently betrayed his Eastern influences in solos and compositions such as "Little Wing" (*Axis: Bold as Love* 1967) (Brown 1997: 160, 169 fn 42).

Heavy metal presents itself as a stylistic continuation of the hippie era in many ways, one of which is in the appropriation of mystical things. Direct musical references to the orient may be found in, for example, Dio's "Egypt (The Chains Are On)" (*Last in Line* 1984) (Example 5.40). In [0:16] the piece is introduced with a synthesized sound that resembles a *zurna*, a double reed instrument used in, for example, Central Asia, South-East Europe and North Africa (e.g. Poché 2008). The "zurna" applies a scale sometimes called *hijaz* (Example 5.41), a mode that "is widespread throughout the Balkans, Greece, Turkey, southern Spain, the entire Arab world and parts of the Indian subcontinent" (Tagg 2003d: 553). In [0:29] the *hijaz* mode is replaced with a minor pentatonic that is played with a synthesizer resembling the Japanese *koto* (e.g. Adriaansz 2008). However, the minor pentatonic that is well-suited to the koto is present only for a few seconds (yet enough to associate the sound and the scale with each other) before it reverts to a descending Aeolian scale (in [0:35]). The Aeolian is not an idiomatic scale for the Japanese koto; however, being played on a Western keyboard, its use is understandable and feels quite natural in this context. The Aeolian also serves as a link between the following chords in the same mode (in [0:41]). Aeolian chords, on the other hand, accompany a guitar riff that is constructed applying a scale called the Hungarian Minor (e.g. Persichetti 1961: 44). In [1:06] both the chords and vocal melody (on the top staff) are Aeolian. However, the vocals may well be described as minor pentatonic, because of the rare occurrence of the only non-pentatonic note *E* on the second degree in m. 4. On the other hand, as the ending note of the second vocal phrase, this $\hat{2}$ rather interestingly forms an unresolved ninth in the harmony.

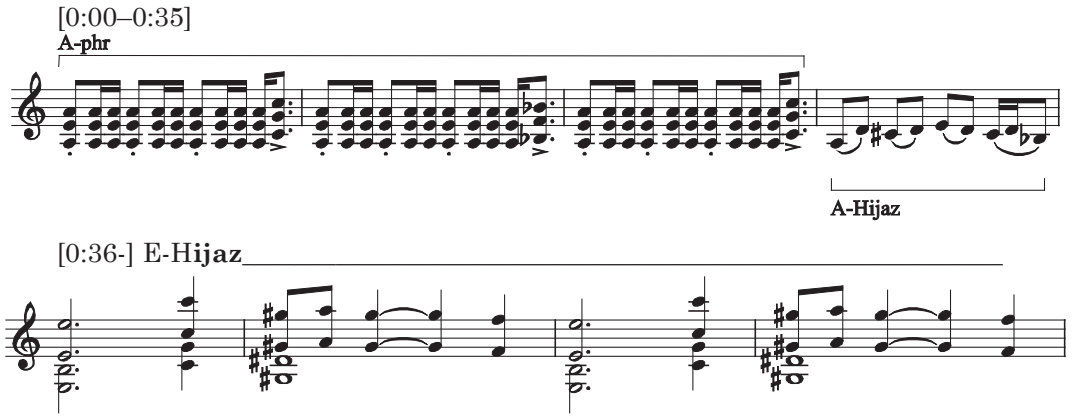
The musical material of the piece is rather freely constructed from various elements derived from very different sources that apparently have little to do with each other, or with the song's (and the album's) theme of Egypt. Iron Maiden's "Powerslave" (*Powerslave* 1984), which also has an Egyptian theme, provides a similar example. Example 5.42 presents the main riffs of the piece that are constructed as mixtures of Phrygian and *Hijaz*.



Example 5.40. Scale material in "Egypt (The Chains Are On)".

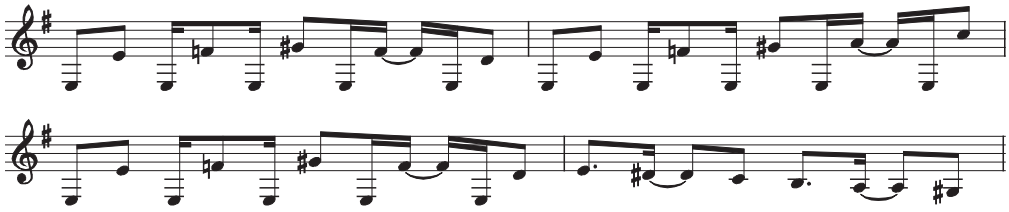


Example 5.41. Hijaz (after Tagg 2003d: 555).



Example 5.42. Phrygian and Hijaz modes in "Powerslave".

Since the ways in which these modes are applied in Western music styles differ fundamentally from the systems of the orient, as do the instruments, this study refers to these modes as "pseudo-oriental". Ritchie Blackmore, the guitar player of Deep Purple and Rainbow, is famous for using pseudo-oriental modes. In Rainbow's "Gates of Babylon" (*Long Live Rock 'n' Roll* 1978) the opening guitar riff is built on the E-Hijaz, although he varies the seventh degree alternating between $\hat{7}$ and $\flat\hat{7}$ (Example 5.43). Interestingly, the flat seventh is used in an ascending motion and the natural degree in descending; by comparison with the common practice voice leading of the classical style, these functions are reversed. Similar passages can be found in the guitar solo and, furthermore, in the string parts of, for example, "Stargazer" (*Rainbow Rising* 1976). Furthermore, at the turn of the 20th century composers in more contemporary styles used the augmented second more freely than their Classical and Romantic colleagues (cf. e.g. Erik Satie's *Gnossienne no. 1*, 1890 to Johannes Brahms' *Hungarian Dances*, 1873).



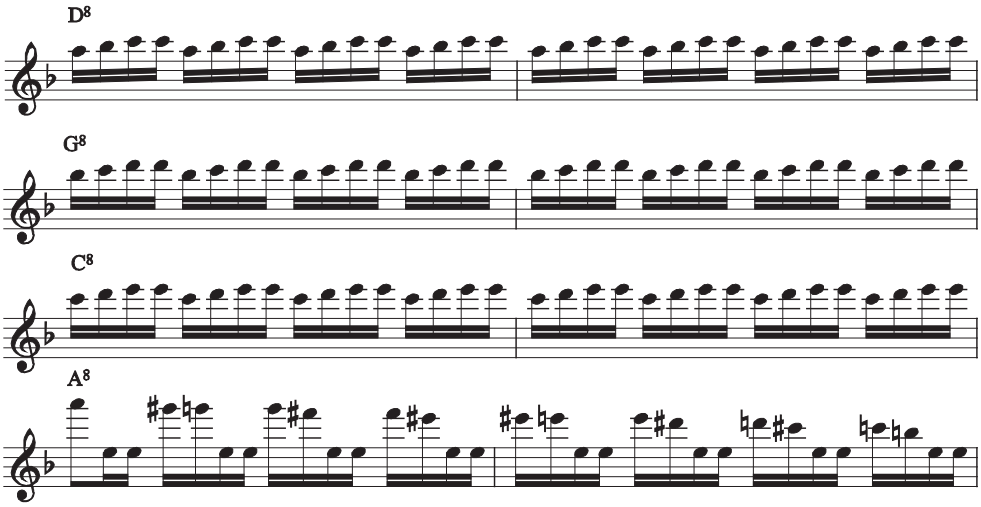
Example 5.43. Riff to "Gates of Babylon" [0:53–1:01] presenting a variation of Hijaz.

According to Walser (1993: 153–154) the free borrowing from and combining of various sources is typical of post-modern thought; however, historically unrelated elements communicate through their present significance. As suggested above, the practice using oriental elements quite freely has been common in Western music at least since the time of the Viennese classics. Whether it was so-called art music or heavy metal in question, oriental references have a similar function: they serve to create an illusion of something distant, mystical, and mythical.

5.3. Major/Minor Tonal Influences

Although, modal scales seem to be particularly important in heavy metal harmony, the influence of classical major/minor tonality is prominent in the heavy metal vocabulary. Heavy metal has taken influences from classical music at least since the early seventies. An easy way of detecting this is to note some

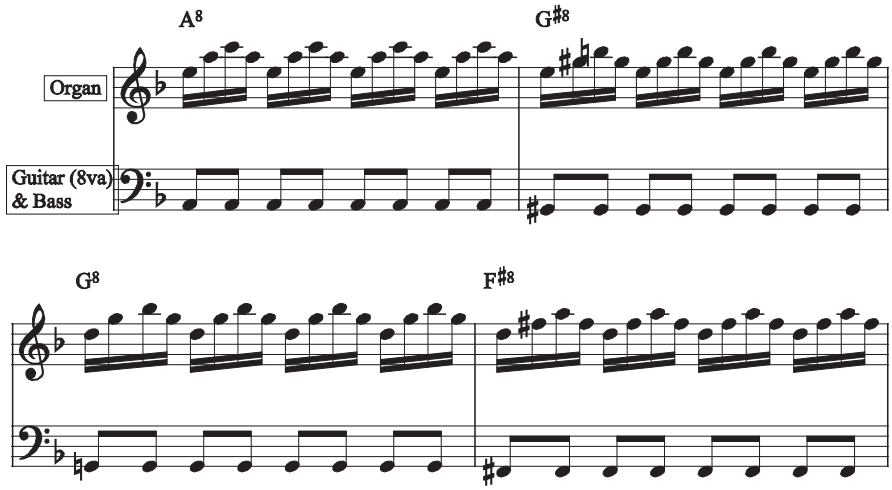
quotations of classical repertoire in heavy metal contexts. For example, Deep Purple's organ player Jon Lord quotes Beethoven's *Für Elise* in "Speed King" (*In Rock* 1970). Lord was classically trained, and even composed a lengthy piece called *A Concerto for Group and Orchestra* (1970) incorporating a full symphonic orchestra with the band (for further details, see Bloom 2006: 128–130). The guitarist Ritchie Blackmore took lessons in classical guitar before Deep Purple, and took up the cello in the late seventies (Webb 1984: 54; Rosen 1984: 59). Blackmore frequently uses melodic figures derived from Baroque composers in his guitar solos and riffs. This has been discussed in length by Robert Walser (1993: 57–107; 1992), so the discussion here is restricted to a single example, "Highway Star" (*Machinehead* 1972). Blackmore comments on the piece's main solo: "it's just arpeggios based on Bach" (Rosen 1984: 62). Although the guitar line is not "arpeggios" in a strict sense, the guitar solo resembles the characteristic Baroque formula of a fast repeated sixteenth note pattern against a chord progression that follows the circle of fifths (Example 5.44). Walser (1993: 65) presents the same example with the guitar harmonized in parallel thirds; Walser's transcription of the descending chromatic line of the last two bars has some details I have heard and notated differently.



Example 5.44. Excerpt from the guitar solo of "Highway Star". Only the first guitar track is included in the transcription. Chord symbols with the figure "8" mean that the accompaniment includes only the single note with (possible) octave doublings.

Jon Lord's organ solo for the same piece shows similar of influences, including arpeggios and an accompanying chromatic descending bass line that

was also favoured by Baroque composers; George Frideric Handel (1685–1759), for instance, uses this technique in *Messiah* (1742) (e.g. Motte 1987: 74). Example 5.45 is taken from Deep Purple's live album *Made in Japan* (1972).



Example 5.45. Excerpt from organ solo for "Highway Star".

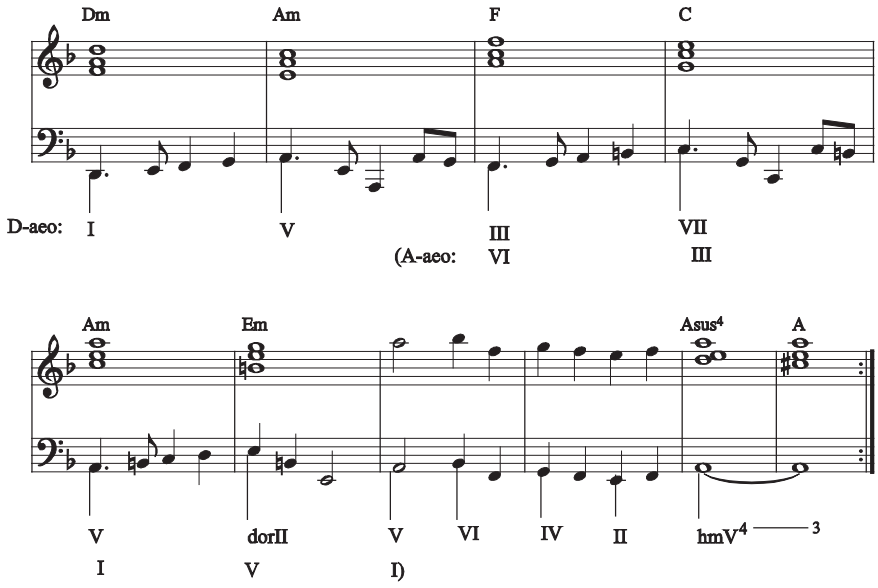
In fact, many heavy metal musicians of the seventies and eighties were either trained in classical music or self-educated in traditional theory of melody and harmony.

> Throughout the 1970s, guitarists continued their experimentation with fusions of rock and classical music. Just as jazz musicians had done in the late 1940s, some rock guitarists turned to classical music theory for new musical resources. (Walser 1993: 65.)

This influence is evident in the works of musicians of the 1980s – classical influences are not anymore quotations or borrowed patterns, rather the classical vocabulary is incorporated into the heavy metal style. Guitar players such as Randy Rhoads and Yngwie Malmsten made the classically influenced features a prominent part of heavy metal vocabulary (see e.g. Walser 1993: 78–102). They had both studied classical music from an early age (ibid. 78, 93), and when turning to heavy metal brought the major/minor tonal practices with them. It is safe to conclude, that they both were accomplished in classical music theory. One example of this can be seen in Rhoads's notational sketches on the album cover of Ozzy Osbourne's *Randy Rhoads Tribute* (1987). The sketches include seventh chord arpeggios for all seven modes in the key of C♯ major, including their primary chords (IIm7, V7 and Imaj7 – as they are typi-

cally notated in jazz). Furthermore, chord substitutions follow the major/minor tonal conventions (e.g. I may be substituted with VI).

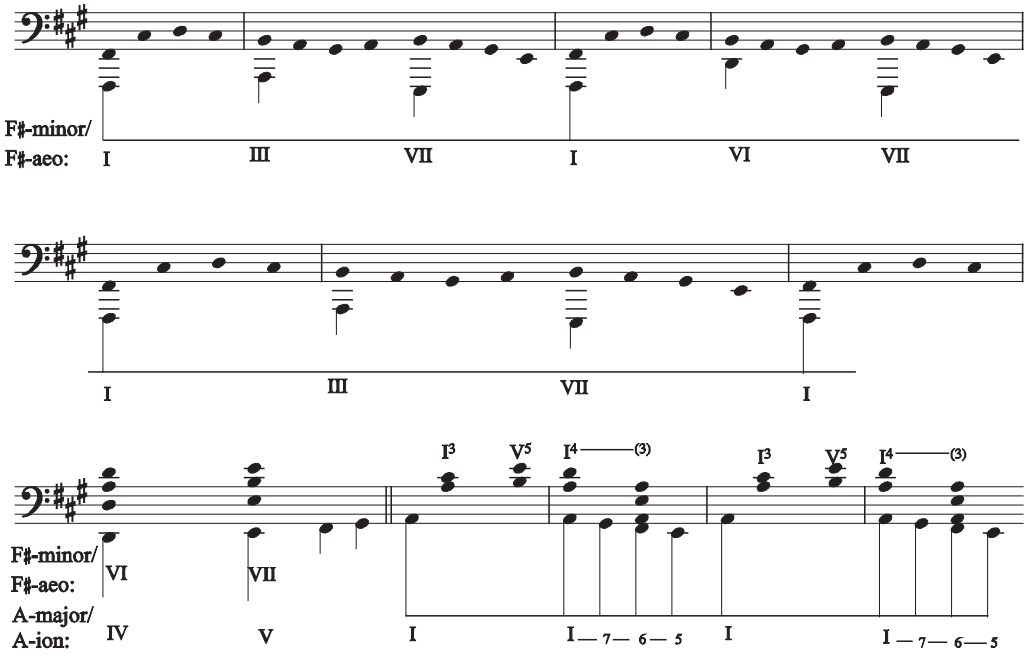
In Ozzy Osbourne's "Mr. Crowley" (composed by Rhoads) a Baroque-like sequence is used in the introduction. The intro is played on the synthesizer with a sound resembling a pipe organ. The chord progression and the bass are very much like that of the traditional *basso continuo* – for example, the bass fills in the gaps between the chord roots with stepwise passing movements (Example 5.46).



*Example 5.46. The intro from "Mr. Crowley" (*Blizzard of Ozz *1981).*

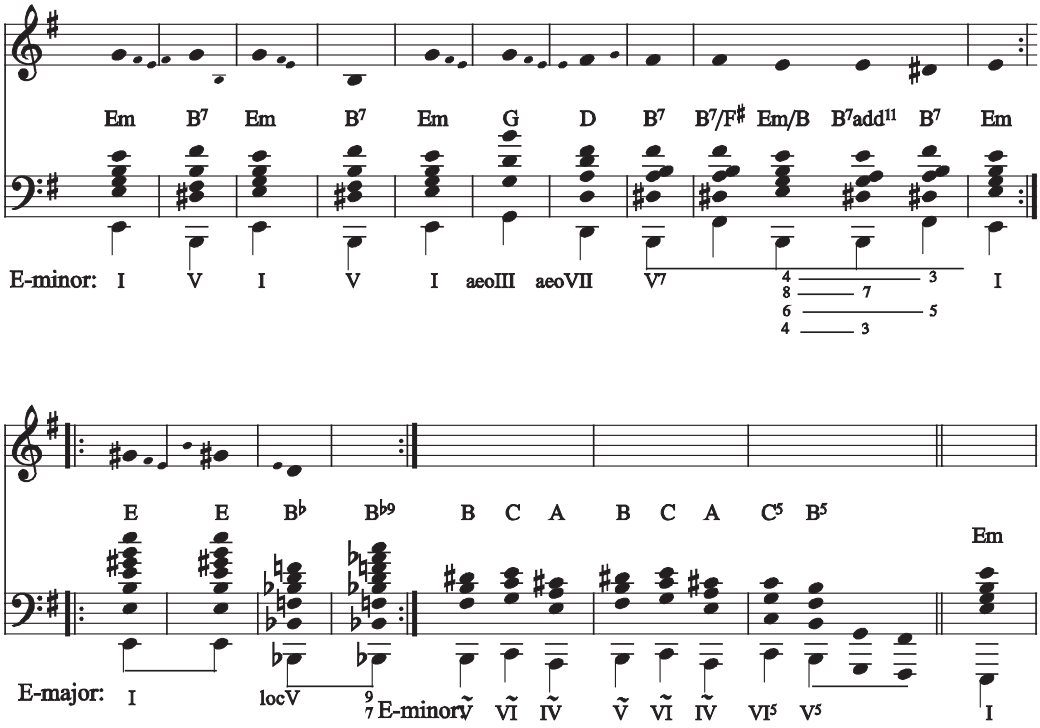
The solo parts of "Mr. Crowley" use the chord progression of the intro; this time modified into a full circle of fifths in D minor. "Until classically influenced heavy metal, such cyclical progressions were unusual in rock music, which had been fundamentally blues-based" (Walser 1993: 80). In another song, "Crazy Train", Rhoads uses yet another classically influenced compositional solution. The key changes between the introduction, verse and chorus make use of the relative minor and major keys (Example 5.47; the piece is analyzed in detail in Lilja 2002). The introduction (mm. 1–7) is based on F♯ minor. However, because of the extremely common Aeolian cadence VI-VII-I, the key is better described as F♯-Aeolian. On the other hand, the verse (starting in m. 9) is in A major (e.g. A-Ionian). The cadence in m. 8 acts as a transition between the two keys – it is first interpreted as an Aeolian cadence, but the interpretation changes as soon as the A major riff starts. After that, the two power chords

of m. 8 with the riff's first chord are perceived in retrospect as the normative major/minor tonal cadence IV-V-I.



Example 5.47. "Crazy Train" (Blizzard of Ozz 1981); the guitar and the bass parts for introduction and the beginning of the verse.

In "Revelation (Mother Earth)" Rhoads makes use of a parallel major and minor (Example 5.48). Also, the instrumentation is classically influenced – there are acoustic guitars (both metal and nylon string), flute, strings, and tubular bells. The verses of the song (mm. 1–10) are played with the soft sounds of acoustic guitars, a string quartet, and the flute. The overall mode is a classically influenced harmonic minor in the key of E – with two modal degrees from E-Aeolian. The cadence in mm. 9–10 includes interesting suspensions. For example, there are two suspended fourths that resolve separately. From m. 11 onwards the instrumentation changes, reverting to the more common heavy metal ensemble including distorted guitars. The key is also changed – although the Locrian V degree creates tonal tension, the overall feel of the key is E major. This change of key is actually quite dramatic. It is noteworthy that when the guitar switches to distortion, the chord structures are based on vertical consonances (see Chapter 4.5). For instance, there are no minor triads until the return to the acoustic-based ensemble in m. 18.



*Example 5.48. "Revelation" (*Blizzard of Ozz *1981). Vocal part is on the upper stave.*

Rhoads himself says on these compositions:

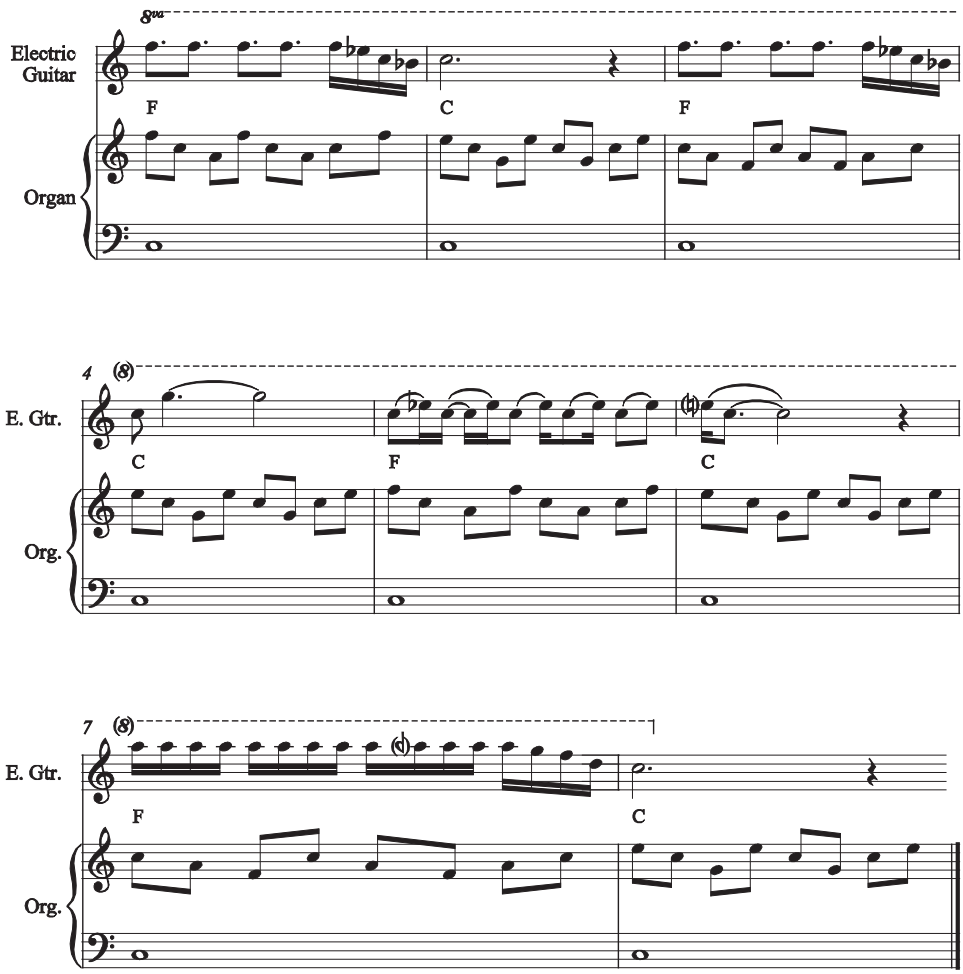
> "Revelation" and "Mr. Crowley" are my favourite cuts on the first LP because both of them have a heavy classical influence. I think the relationship between heavy metal and classical music is great. (Obrecht 1984: 176.)

Rhoads was not the only or the first one to make heavy use of classical music, but certainly he was one of the most influential players/composers in that field.

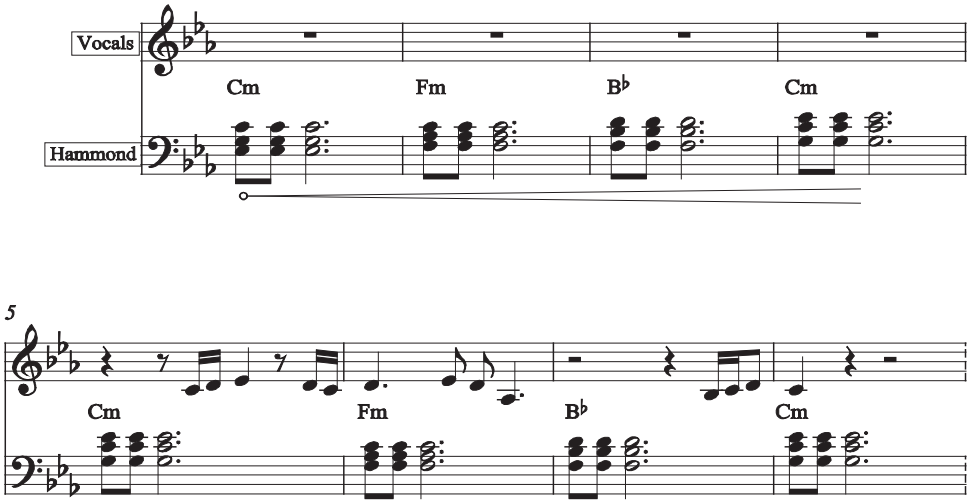
> Rhoads's interest in music theory was symptomatic of the increasing classical influence on heavy metal, but his success also helped promote classical study among metal guitarists. Winner of Guitar Player's Best New Talent award in 1981, Rhoads brought to heavy metal guitar a new level of discipline and consistency, derived from classical models. […]Rhoads' accomplishments also contributed to the growing tendency among guitarists to regard their virtuosic solos in terms of a division of labor long accepted in classical music, as opportunities for thoughtful composition and skilful execution rather than spontaneous improvisation. (Walser 1993: 84.)

Numerous other heavy metal guitarists have discussed their appropriations of classical music – starting from Jimi Hendrix (Burks 1984: 22), Jimmy Page of Led Zeppelin (Rosen 1977a: 44, 50), and John Paul Jones, the bass and keyboard player of the same band (Rosen 1977b: 104), to K.K. Downing and Glenn Tipton, the guitarists of Judas Priest (Varney 1984: 132).

Often major/minor tonal, modal, and pentatonic features act in parallel. The interplay of different traditions is evident in the introduction of Uriah Heep's "July Morning" (*Look at Yourself* 1970) (Example 5.49). The Hammond organ has established the key of C major some eight bars before with a plagal IV-I progression. At the beginning of this excerpt, the guitar employs a C minor pentatonic scale for the first five bars of the solo, only joining the organ in the occurrence of a major third of the C major key in mm. 6. From mm. 7 on, the guitar part can be interpreted as being in the fifth mode of the major pentatonic – the so-called natural pentatonic mode (e.g. Burbat 1988: 114). The beginning of the verse of the same song moves from a major versus pentatonic environment to a modal one (Example 5.50). The organs chords start at such a low volume that they slide to the new mode of C-Aeolian (i.e. parallel minor) almost imperceptibly – a listener would hardly notice the change of a mode. From this point onwards the chords and the melody cohere on the same mode, and support each other. Furthermore, the organ uses voice leading familiar to the practice of *basso continuo* – for instance, there are no parallel fifths in the organ part. This type of fusion between different traditions is frequent in heavy metal; the mixtures here not only include scales and modes, but also voice leading practises.



Example 5.49. Introduction to Uriah Heep: "July Morning".



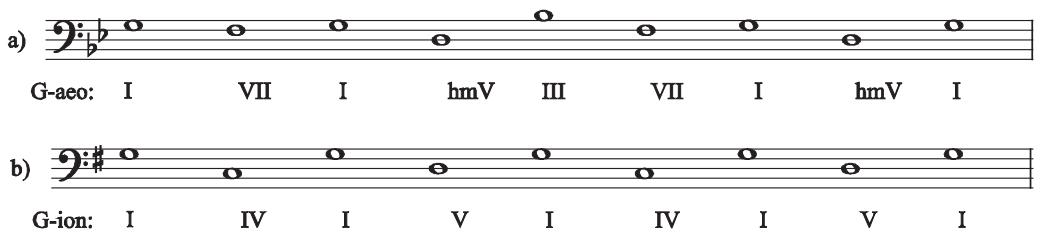
Example 5.50. Beginning of the first verse of "July Morning".

5.4. Some Distinct Chord Patterns: The "Grounds" of Heavy Metal

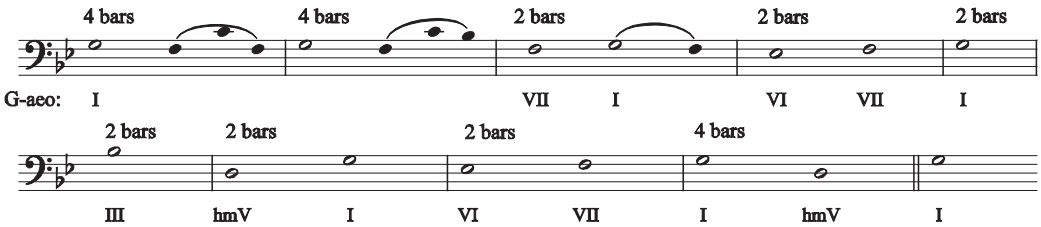
Repeating chord patterns that are sometimes called "grounds" or "ground basses" have been used since the Renaissance era, when they were first associated with and applied to particular dance forms (e.g. Hudson 2006a). "These schemes consist of fixed successions of root-position triads and were used from the end of the 15th century to about 1650 for the construction of musical frameworks" (ibid.). Baroque composers such as Claudio Monteverdi used the same basic formula but conceived as bass melodies rather than harmonic progressions (Hudson 2006b, 2006c), whereas "[g]rounds are relatively rare in the Classical and Romantic periods" (Hudson 2006d).

In heavy metal the equivalent of the ground bass could be described as a mixture of Baroque and Renaissance practices. The formulae are constructed of repetitive chord sequences rather than bass melodies, but the chord sequences are not strictly tied to Renaissance styles. The Renaissance schemes included, among others, *passamezzo antico* and *passamezzo moderno* (Example 5.51). These two formulae have been used in various forms since the 16th century (Gerbino & Silbiger 2006). It has been suggested that the *passamezzo moderno* relates to the twelve bar blues scheme (Van der Merwe 1989: 191–203), whereas the modal shifts of the *passamezzo antico* resemble those of some heavy metal chord progressions (e.g. stepwise pendular motion I-VII-I and the plagal motion III-VII). For instance, the Aeolian III-VII-I is very often used (e.g. riff

to "Paranoid"). The verse of Rainbow's "Kill the King" (*Long Live Rock 'n' Roll* 1978) presents a more extended variation of the technique and also includes Aeolian VI-VII-I progressions (Example 5.52).



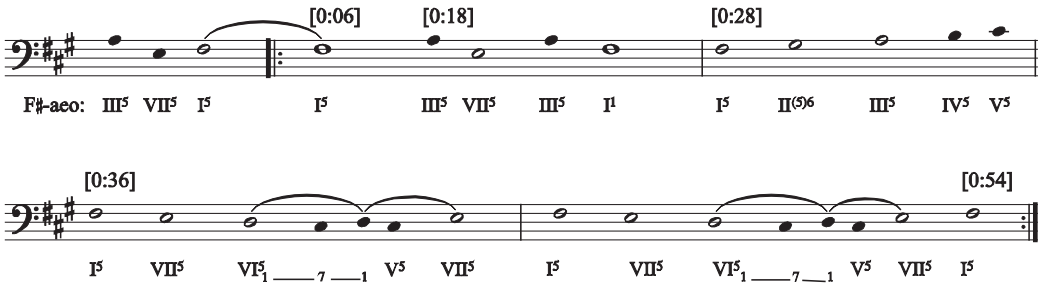
Example 5.51. Chord roots for passamezzo antico *(a) and* passamezzo moderno *(b) in the keys of G (after Hudson 2006a). Modal signatures and chord symbols are modified to meet the purposes of this study.*



Example 5.52. Chord progressions in "Kill the King". Bar lines represent hypermetric units.

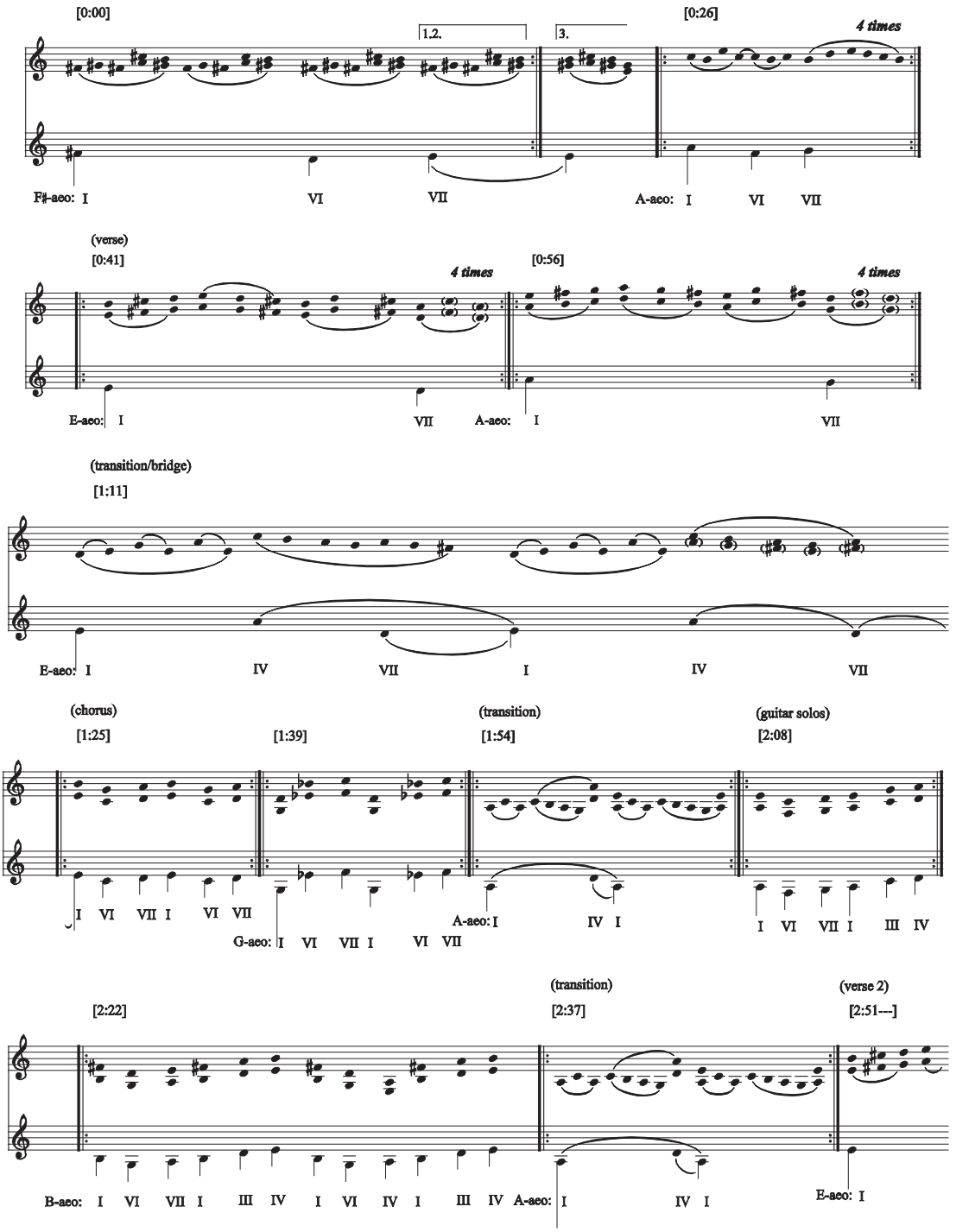
Repetitive chord sequences like these may be used to form open-ended structures (e.g. Moore 2001: 52) or they may follow open/closed principle (e.g. Middleton 1990: 219–220; cf. Schoenberg 1967: 20–21). The latter is common to much art music (especially of the Classical period), jazz, and the Tin Pan Alley style. In open/closed structures the principle of phrase structuring is to move away from the centre key (or the "home" key) and then back towards it. According to Richard Middleton (1990: 220), "riff-based structures in particular often have very little sense of leaving 'home' and no strong 'return', no definite closure. Time, then, is constructed as 'mythical'…, rather than directed to a goal." At first glance this seems to apply much heavy metal; for example, riffs in compositions such as "Egypt (the Chains Are On)" and "Gates of Babylon" are clearly open ended; Aeolian pendulums and shifting tonal centres in "Aces High" give perhaps an extreme example of this. On the other hand, many riffs such as in "Paranoid" or "Smoke on the Water" do have a definite tonic closure, although on a miniature scale. As an example of slightly larger -scale structure, the verse and chorus of Iron Maiden's "Flight of Icarus" (*Piece of Mind* 1983) is

mainly built on closed structures; even if there is no strong departure from the home key. The first section of the verse (ca. [0:06–0:28] in Example 5.53) ends on the tonic chord on a relatively weak part of the rhythmic group (cf. Cooper & Meyer 1960: 39). The second section has an open ending, closing on the first tonic chord of the chorus (ca. [0:36]). The first and the second ohalvesf of the chorus end differently; the first is open, the second closed.



Example 5.53. Chord sequences for the verse [0:06–0:36] and chorus [0:36–0:45] in "Flight of Icarus".

A pattern of particular importance is the so-called "Aeolian pendulum" (Tagg 2003b: 542; Björnberg 1984), a repetitive chord progression that is constructed only of Aeolian scale degrees. The Aeolian VI-VII-I seems to have assumed the function of a cadence, more or less in the same sense as the IV-V-I cadence of the major/minor modes (see Björnberg 1984: 373). A typical example on this is "All Along the Watchtower" (see Chapter 3.2). In heavy metal, however, tertial chords are usually replaced with power chords that are built on Aeolian scale degrees. Examples of Aeolian cadences in heavy metal are numerous. Especially Iron Maiden has made this cadence almost their trademark. In "Aces High" (*Powerslave* 1984) Aeolian cadences are used around shifting tonal centres (Example 5.54). In the piece lasting about seven and a half minutes Iron Maiden go through several modulations applying Aeolian progressions. The reduced excerpt below shows the guitar parts (top staff) and harmony fundamentals (lower staff) for the introduction, first verse, chorus, and guitar solo sections.



Example 5.54. Aeolian pendulums and other cadences in "Aces High".

5.4.1. "Rising Sun" Pattern

A distinct chord pattern that frequently occurs in heavy metal is based on a folk ballad "The House of the Rising Sun" (Example 5.55) that was made famous in the 1960s by a British band the Animals. The progression is based on the Aeolian mode, with progressions that are modal rather than major/minor tonal; in this way it resembles the *passamezzo antico*.

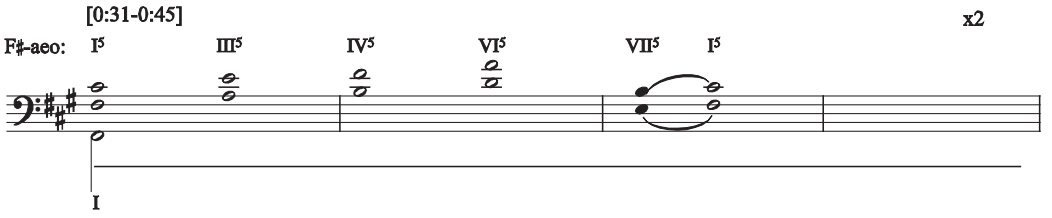
aeo:

I	III	dorIV	VI
I	III	hmV	
I	III	dorIV	VI
I	hmV	I	

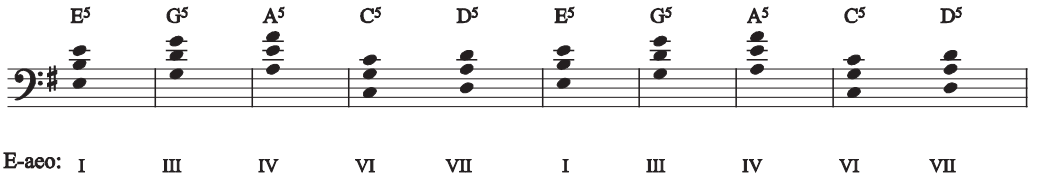
Example 5.55. Chord progression in "The House of the Rising Sun".

Of particular interest here, however, are the first five chords. This progression away from and back to the tonic was used in the 1960s in, for example, "Gimme Some Lovin'" (*The Best of the Spencer Davis Group Featuring Stevie Winwood* 1967); after that the progression appears with various modifications in heavy metal of the 1970s and through the 1980s. For instance, the chords in Ozzy Osbourne's "Rock 'n' Roll Rebel" (*Bark at the Moon* 1983) are built on this "Rising Sun" pattern against the bass pedal point (Exapmple 5.59). Many times the VII is included; as it fills in between the VI and I, completes the Aeolian cadence. In "Rock 'n' Roll Rebel" the VII is used as a short passing chord, but sometimes it is a more equal member of the progression. This kind of elaboration of a passing chord can be found in, for example, Deep Purple's "Knocking at Your Backdoor" (see Example 5.18) that rigorously follows this progression. The ending section of Iron Maiden's "Running Free" (*Iron Maiden* 1980; Example 5.57) and the refrain of "Highway Star" (*Made in Japan* 1972; Example 5.58 in the following Chapter) offer examples of similar progressions.

Although the "Rising Sun" patterns are mainly in the Aeolian mode, the chord roots can be seen as constituents of a pentatonic scale; the third mode of the C major pentatonic scale, which starts from the third note of C major pentatonic (e.g. Backlund 1983: 42). The popularity of the using chords based on this scale could be due to the efforts (conscious or not) to avoid scale degrees which as triads would form minor chords. For example, Aeolian V would be a minor and the II a diminished triad.



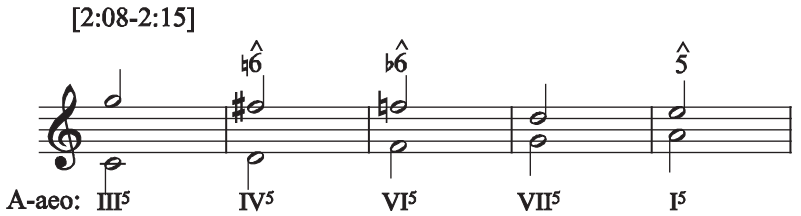
Example 5.56. Reduction of guitar and bass part in "Rock 'n' Roll Rebel" (verse).



Example 5.57. Chord progression of the ending section in Iron Maiden's "Running Free".

5.4.2. "Romantic Cliché" and "The Saints" Pattern

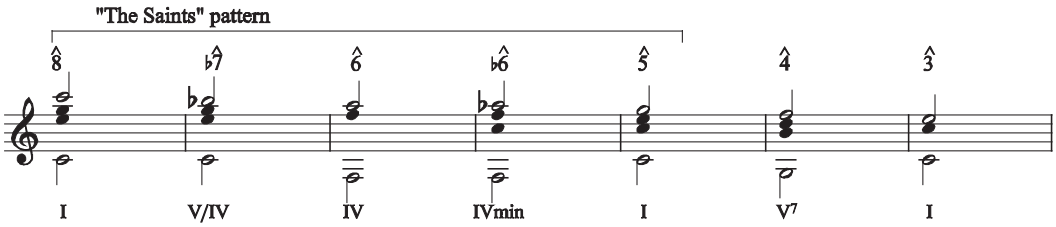
Consecutive use of major and minor subdominants is a feature of Romantic harmony (Salmenhaara: 1980: 249). Cases like this usually incorporate a motion from Dorian § $\hat{6}$ to Aeolian b $\hat{6}$ to $\hat{5}$. Examples include sections from Schubert's *Das Wirtshaus* and Frederick Chopin's *Nocturne*, Op. 32, no. 2 (Salmenhaara 202, 249–250; Aldwell & Schachter 1989: 357). The refrain of "Highway Star" presents a similar case (Example 5.58). The "Romantic" voice leading pattern is here mingled with the "Rising Sun" chord pattern, although the initial scale degree one is omitted from the progression.



Example 5.58. "Highway Star" (refrain).

An extended pattern with the same linear motion can be found in gospel classic "When the Saints Go Marching In". The following example gives the underlying harmony for the lyrics "I want to be in that number / when the saints

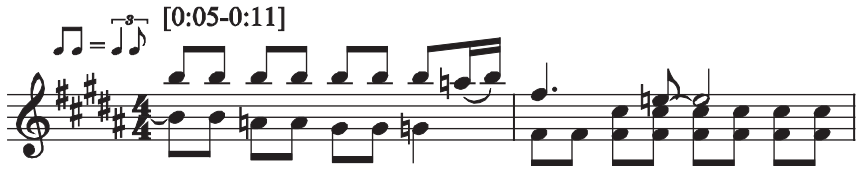
go marching in" (Example 5.59). Regarding the development of patterns of harmony, "The Saints" opens up two interesting lines of discussion. The first is the harmonisation of the §$\hat{6}$ and b$\hat{6}$. Examples can also be found in ragtime as well as in the Romantic and parlour music of the 19th century (Van der Merwe 1989: 262, 233). For instance, Scott Joplin harmonizes both degrees with IV in "The Entertainer" (mm. 17–20, in *Ragtime Showstoppers* 1987: 10–13; also see Berlin 2005). The Beatles, who recorded and performed the song in the early 1960s (Everett 2001: 86, 100), subsequently applied a similar pattern in "I Saw Her Standing There" (*Please, Please Me* 1963). However, with the b$\hat{6}$ they used VI instead of the IV (cf. Wagner 2003: 356–357; also, see Everett 2001: 384n131). Although also used in Classical and Romantic music (Van der Merwe 1989: 262–264), this seems to serve as a link to some heavy metal patterns. For instance, these harmonies are used in "Highway Star" above. It appears that the minor sixth is harmonized with VI in order to avoid the minor harmony it would form with IV. In addition, in this way the bass/chord progression becomes less static. Given that most heavy metal has a strong emphasis on the bass part, this may well be the reason for favouring VI.



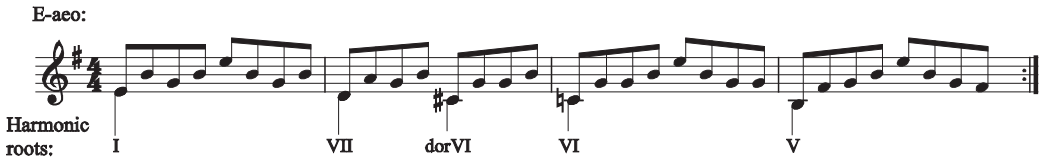
Example 5.59. Harmonic outline in "When the Saints Go Marching In". The most important linear motion, "The Saints" pattern, is situated in the top voice.

The second line of discussion concerns cases where "The Saints" voice leading pattern $\hat{8}$–b$\hat{7}$–§$\hat{6}$–b$\hat{6}$–$\hat{5}$ is removed from the original harmony. This is an example of one of the standard patterns for downhome blues as presented, for example, in the introduction of Robert Johnson's "Kind Hearted Woman Blues" (Example 5.60). This idiom has been widely applied to blues rock and subsequently heavy metal with more or less variation. For instance, Deep Purple's "Lazy" (*Made in Japan* 1972) ends with a passage that is clearly based on this pattern. Furthermore, "The Saints" pattern is sometimes situated on the lowest voice of the harmony as in "The Entertainer", in which the original chords are applied. However, this new bass line may in turn be harmonized with new chords. Examples include Cream's "White Room" (Example 4.32 in Chapter 4.6.1.), in which the pattern is harmonized with alternating

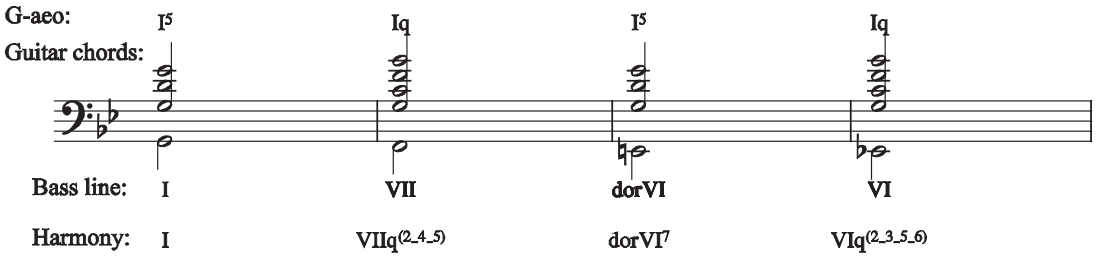
major triads and power chords. Led Zeppelin's "Baby, I'm Gonna Leave You" (*Led Zeppelin* 1968) and Black Sabbath's "Snowblind" (Example 5.61) make use of arpeggiated chords. The instrumental break of Black Sabbath's "Black Sabbath" (*Black Sabbath* 1970) is an interesting case (Example 5.62). The bass applies "The Saints" pattern, but without the V (this is similar to the "White Room" progression); the guitar alternates between a power chord and a quartal structure on the same root of G. As a result of these two played simultaneously, the overall harmony is more complex than the guitar chords alone would suggest.



Example 5.60. "The Saints" pattern in the guitar introduction of "Kind Hearted Woman Blues" (take one).



Example 5.61. Guitar part in "Snowblind" (bridge, starting at ca. [1:40]).



Example 5.62. "Black Sabbath" (start of the instrumental break at the ending section).

5.4.3. Twelve-Bar Blues Formulas

"The term 'Twelve-bar blues' is, as usual, a misnomer" (Van der Merwe 1989: 129). It is an abstract formula that is "strictly optional" (ibid.). Many compositions that are supposedly based on it follow neither its harmonic scheme nor

its bar lengths (see Dauer 1979 9–92). However, "[t]he interesting thing about these chord strings is that they avoid the usual three-chord pattern of I IV V I, fundamental not only to the European classics but also to most Europeanized African music" (Van der Merwe 1989: 198–199). Common to the many variations of the harmonic scheme is that there usually is a tonic chord between IV and V. This has been explained as a fusion of the *passamezzo moderno* (see Example 5.51b) with the three-part structure of the blues (Van der Merwe 1989: 199–203). An interesting variation is the one that includes a motion V-IV-I. This plagal cadence is very typical to the blues and rock 'n' roll, but it is not completely unknown in the European art music classics. It can be found in, for example, Felix Mendelssohn's Overture to *A Midsummer Night's Dream* (see e.g. Piston & DeVoto 1987: 179).

Since the twelve-bar blues formula is not necessarily twelve bars long, the idiom (as presented in Example 5.63) is better described as a three-part structure. The three-part structure has its history in both African and European folk traditions (Van der Merwe 1989: 184–197). Usually phrase 1 is repeated in phrase 2 (with different harmony); phrase 3 serves as a contrasting section. Regarding its many variations in heavy metal, function theory seems to be a useful way of approaching this formula: the three phrases may be named after their dominating function as the Tonic, the Subdominant and the Dominant phrases.

phrase 1 (T):	‖: I	| (IV)	| I	| I	|
	T	S			
phrase 2 (S):	| IV	| IV	| I	I	|
	S		T		
phrase 3 (D):	| V	| (IV)	| I	| (V)	:‖
	D	S	T	D	

Example 5.63. Twelve-bar blues formula. Common variations are indicated with parentheses.

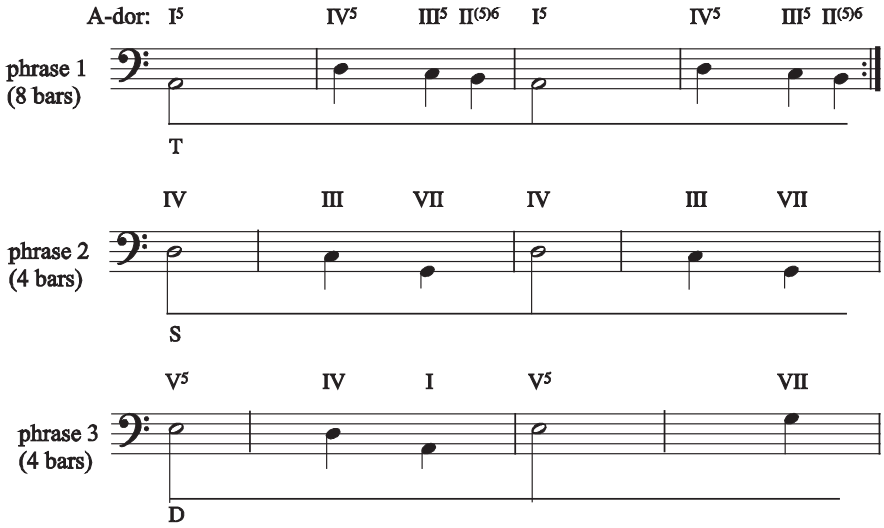
The twelve-bar blues scheme has been an important source especially for early heavy metal, although it has usually been subjected to modifications to various degrees. For instance, in "Since I've Been Lovin' You" (*Led Zeppelin III* 1970) the harmonization somewhat differs from the standard (Example 5.64). Kernfeld & Moore (2005) argue that the harmonic pattern in the last four bars is found in the bass alone. However, it is also used for the organ part and well supported with the guitar.

C-aeo:

I	IV	I	I
IV	IV	I	I
hmV	VI hmV	I hmV I III	II phrII

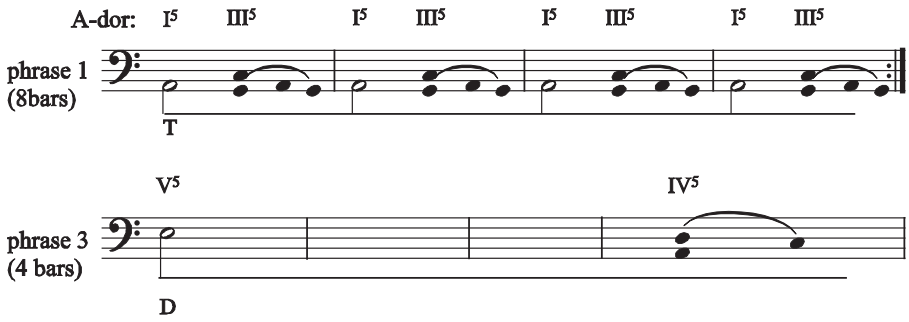
Example 5.64. Twelve bar blues scheme in "Since I've Been Lovin' You" (cf. Kernfeld & Moore 2005).

Examples 5.65 through 5.68 illustrate some harmonic patterns in heavy metal that may be traced back to the twelve-bar blues idiom, although none of them rigorously abide by it. AC/DC's "Hells Bells" (*Back in Black* 1980) repeats twice the first phrase of the formula, thus extending it to sixteen bars. A variation of the basic harmonic structure occurs in the second and the third phrase, which, instead of returning to the Tonic at the halfway point, stay on the Dominant and the Subdominant, respectively.

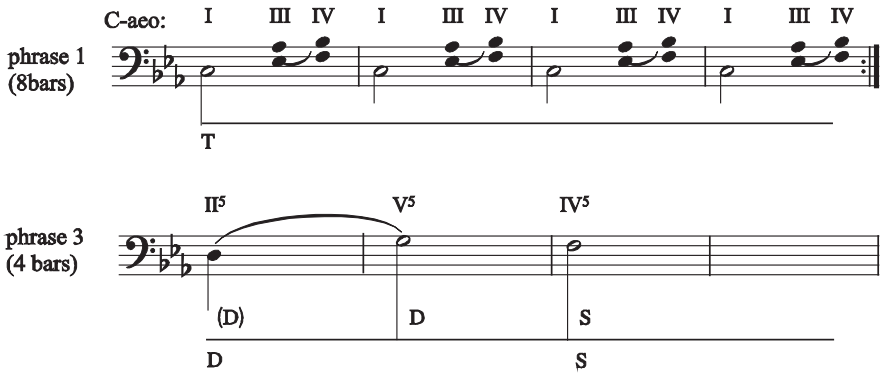


Example 5.65. Harmonic reduction of "Hells Bells" (verse) [1:18–2:04].

Motörhead's "Stay Clean" (*No Remorse* 1983) presents another variation (Example 5.66). The Subdominant phrase is omitted, and replaced with an extended Tonic phrase. In this regard, "Metropolis" from the same album is rather similar (Example 5.67). In these two pieces, the third phrase is treated a bit differently. Both end with a plagal V-IV cadence. However, in "Stay Clean" the IV is delayed from its "normal" place until m. 12, in "Metropolis", however, the Dominant is divided into II-V progression, a practice that is common in jazz (see e.g. Kernfeld & Moore 2005).

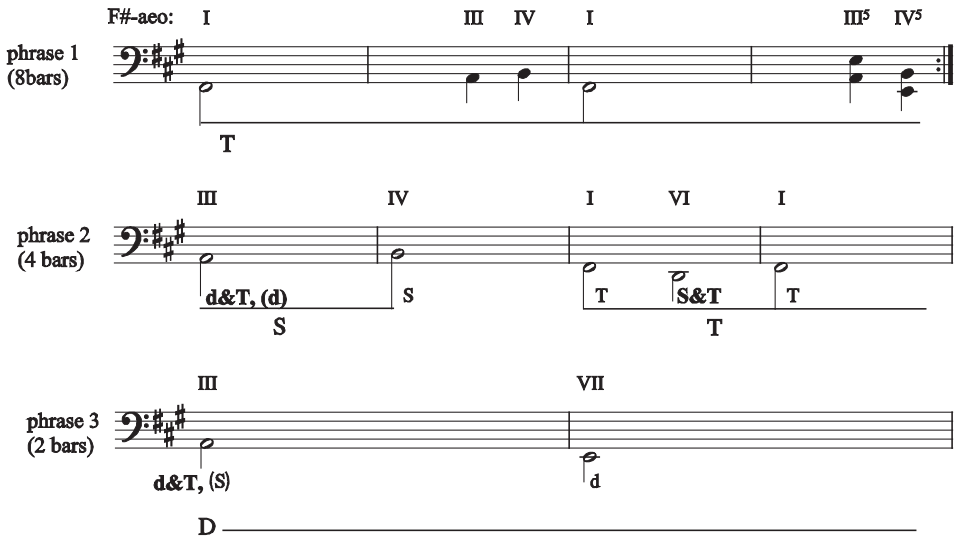


Example 5.66. Harmonic reduction of "Stay Clean" (verse) [0:17–0:35].



Example 5.67. Harmonic reduction of "Metropolis" [0:30–0:48].

Example 5.68 shows the twelve-bar blues scheme in "Mistreated" from Rainbow's album *On Stage* (1977 (original version in Deep Purple's *Burn* 1973). The idiom is further modified, but still recognizable. The Tonic phrase is doubled as in the three examples above. The second phrase is of standard length, but the third phrase lasts only for two bars. Both of them may be seen as re-harmonized versions of the standard pattern. The III chord is used here to modify the harmony of the standard formula. As usual, III has an ambiguous functional attitude (see Chapter 3.4), having a two-fold meaning. As in both cases here, it can be heard as a representative of either the Tonic or the Dominant. However, the harmony that follows may change the way the chord is interpreted in retrospect. In the second phrase, the III can be heard as leading to the Subdominant (i.e. as a weak secondary Dominant), whereas in the third phrase it serves as a secondary Subdominant to the VII (weak Dominant). Thus, the second and the third phrase may be seen as fundamentally similar to the standard formula, although in this case the standard fifth-progressions are substituted with stepwise and third related motions.



Example 5.68. Harmonic reduction of "Mistreated" [2:14–3:00].

Much of the basic harmonic structure of heavy metal is built upon these patterns. Even if the presentation of these patterns is not, and probably can not be, conclusive, I believe that these examples give a substantial overview of the various sources on which the harmonic progressions of heavy metal are based.

6

Linear and Structural Harmony

> Without organization music would be an amorphous mass, as unintelligible as an essay without punctuation, or as disconnected as a conversation which leaps purposelessly from one subject to another (Arnold Schoenberg 1967: 1).

This chapter presents one way of drawing together the theories and analytical concepts discussed in the earlier parts of this study, suggesting a combination of Schenkerian and Riemannian concepts for analytical use. Whereas Schenkerian theory is usually thought of as mainly concerned with linear harmony and voice leading, Riemannian theory is seen as fundamentally vertically oriented. However, here they are seen as not contradictory, but complementary. It is suggested that combining these two perspectives will increase the understanding of heavy metal harmony and compositional structures in ways that have not been discussed before. The discussion begins with smaller scale examples before developing more complicated analyses.

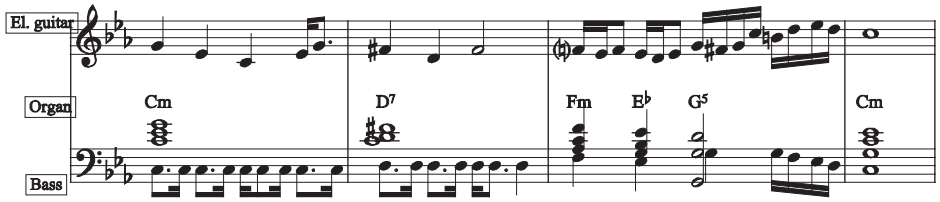
6.1. Linear Analysis

This study has so far stressed the vertical aspects of music. Felix Salzer (1982: 10) calls this kind of analysis "chord grammar". "It is a purely descriptive means of registering and labelling each chord and relating it to different key centers." (Ibid.) In principal, linear analysis means greater emphasis on horizontal aspects. This results in more reductive presentations than have been applied in earlier parts of this study, although most types of vertical analysis involve at least some kind of reduction; even in the simplest scale-degree analysis of a four-part Bach chorale some notes and chords are considered as having a passing or neighbouring function, and are therefore removed from consideration.

Linear analysis, which Salzer calls "the study of chord significance", takes this line of thinking further.

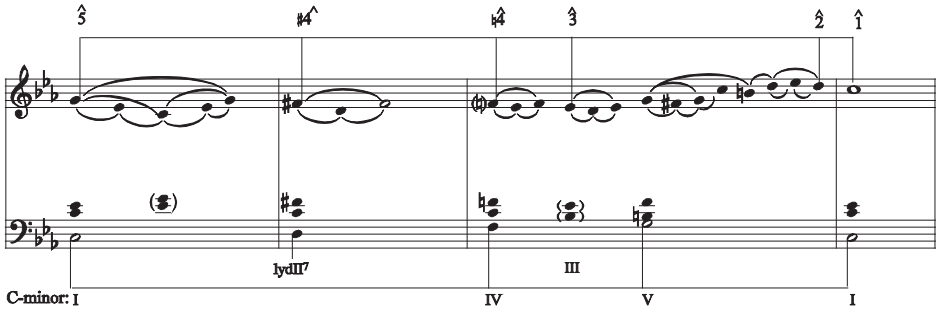
> The study of chord significance, on the other hand, reveals the meaning of a chord and the specific role it plays in a phrase or section of a work, or in the work in its entirety. Chord significance, since it discloses the function of a chord, goes far beyond grammatical description by pointing out the special, architectonic purpose of a chord within a phrase. As a first result of this distinction, Schenker found that the roles which chords play in a musical phrase or section are very diverse; even two grammatically identical chords appearing in the same phrase can fulfil totally different functions. (Salze 1982: 10.)

Although heavy metal frequently uses a rather different tonal language, the Schenkerian *Ursatz* (see Chapter 3.4) seems to be a useful benchmark against which the level of common practice tonal structures can be assessed.[20] Schenker saw the well-supported closure from $\hat{2}$ as fundamental to musical structures: "The fundamental line [*Urlinie*] begins with $\hat{8}$, $\hat{5}$, or $\hat{3}$ and moves to $\hat{1}$ via the descending leading tone $\hat{2}$" (Schenker 1979: 13; also, see pp. 4–9). An instrumental section for the ending section of Uriah Heep's "July Morning" (*Look at Yourself* 1970; Example 6.1) provides an example, for which the Schenkerian approach seems apt. The reduction in Example 6.2 shows the descending fifth-progression in the melodic line, including a chromatic passing note ♯4. The harmony can be seen as satisfying the perfect cadence formula I-IV-V-I. Then, the Lydian D^7 chord and the E♭ major triad have the status of embellishing passing chords. However, there is a certain difficulty concerning the Schenkerian approach. To my mind (or better, to my ears) far too much emphasis is placed on the $\hat{2}$ in m. 3, if compared to the G in the melody on the same bar. Of course, the D can be seen as filling in the descending line, but if the fundamental descent is considered, this interpretation seems somewhat inappropriate.



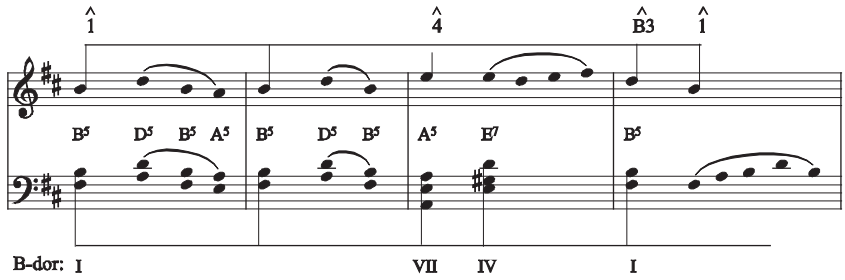
Example 6.1. An excerpt of "July Morning".

20. Tom Pankhurst (2003: 329) adopts somewhat similar standing point. He also combines Schenker's model of tonal music with elements of Eero Tarasti's *Theory of Musical Semiotics* (1994).

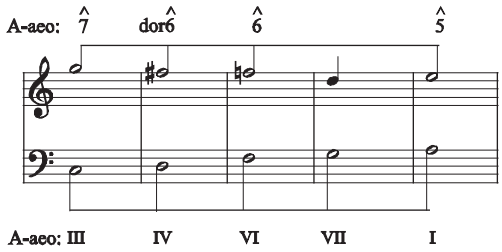


Example 6.2. A Schenkerian type of reduction of the previous example.

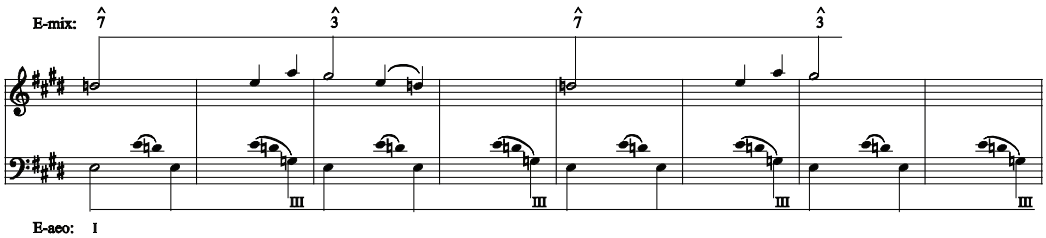
However, this kind of closure is often nonexistent; especially in cases that apply blues scales for melodic parts. Example 6.3 shows one such case: the minor pentatonic melody in Deep Purple's "Strange Kind of Woman" (*Made in Japan* 1972) used the B$\hat{3}$ for the closure of the melodic line, going against the Schenkerian archetype (other such closures of miniature scale are discussed in Chapter 5.1.3). Furthermore, the melodic lines often do not resolve to the tonic at all; for instance, the melodic closure in "Highway Star" from the same album is on $\hat{5}$ (Example 6.4). The use of *finalis* (i.e. any note ending a section) rather than tonic is common in heavy metal as well as in other musical traditions (cf. Pennanen 1999: 40–41). Sometimes the melodic line avoids the tonic even more persistently. Shifting between Mixolydian $\hat{7}$ and $\hat{3}$ above an Aeolian riff, Black Sabbath's "War Pigs" presents such a case (Example 6.5; cf. Chapter 5.2.1, Example 5.39.). Many similar examples can be found in the musical literature.



Example 6.3. "Strange Kind of Woman" (verse) [0:12–0:20].



Example 6.4. Reduction of "Highway Star" (refrain) [1:28–1:35].



Example 6.5. Reduction of "War Pigs" [2:19–2:28].

6.2. Structural Harmony

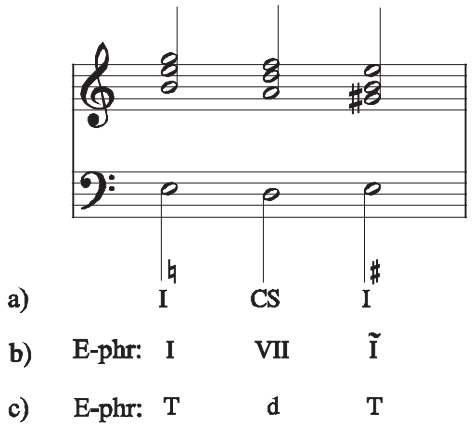
Schenker's original idea of understanding musical structure was based on three basic levels. All the details of a composition are shown in the *foreground* level, whereas the *background* governs the totality of a compositional structure (Schenker 1979: 3–9), and is expressed in *Ursatz* (see Chapter 3.4). Between the two there is an intermediate level called the *middleground* through which the background structure is elaborated into the foreground. The levels are connected in a similar way in the work of the *Gestalt* psychologist Noam Chomsky, who differentiates the surface level from the abstract syntactic structures of spoken language (cf. Larson 1998: 212; Chomsky 1965: 4; Lehrdahl and Jackendoff 1987). In the same way as Chomsky, Schenker stresses the understanding of music on a number of hierarchical levels.

In his development of Schenker's ideas Salzer (1982: 11–14) divides chords into two categories; some chords form a *structural framework* for the compositions, whereas the others are *prolonging chords*. The structural framework is defined by the goals towards which the melodic/harmonic motion is directed, whereas other chords that embellish this framework are not fundamentally important for the structure. In Schenkerian thought, the structural framework usually consists of the authentic I-V-I progression or its derivatives (see e.g.

Schenker 1979: figs. 1, 5, 10 and 11). However, as discussed earlier in Chapter 3.4, plagal frameworks are equally important in heavy metal.

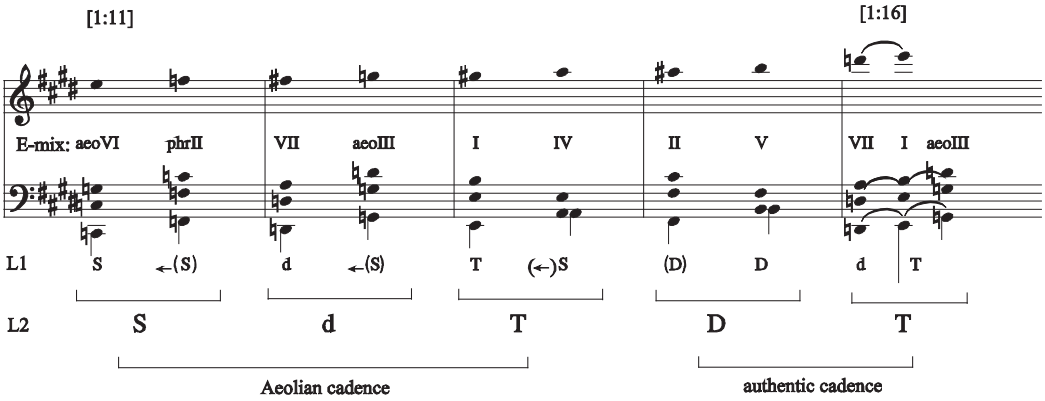
Based on fundamentally Riemannian concepts, Arnold Schoenberg (1878–1951) developed a model for comprehending tonal structures in extended pieces of music (see Schoenberg 1954). The model suggested that, for example, modulation to different tonal regions could be heard as functional in relation to the Tonic governing the whole structure of a piece. In this sense, Schoenberg's theory reflects Schenker's views (cf. Salzer 1982), even though his terminology and nomenclature are obviously derived from Riemann. It is suggested here that many heavy metal compositions, too, operate on structural levels that are based on different tonal regions. However, taking into account everything that has been stated earlier about chord construction, counterpoint, voice leading and the fact that heavy metal compositions tend to stay close to the overall tonic, deploying Schoenberg's extensive framework in order to define tonal regions would seem like overkill. Instead, the functional nomenclature introduced in Chapter 3.4 is used for this purpose. The following concentrates on examples of how linear and functional harmony may be understood in terms of structural levels in heavy metal.

The style of analysis developed by Salzer in his *Structural Hearing* (1982) provides a useful model for the analyses here, even though the intent is very different. Salzer differentiates between Schenkerian fundamental structure and other types of structural frameworks. Although he clearly recognizes the possibility of various types of frameworks, his division seems to have an ideological basis: I-V-I is seen as the ideal form, and consequently other structural frameworks must be differentiated from it. For instance, the term "contrapuntal-structural chord" (abbrev. CS) is used for chords that do not conform to Schenker's restrictive view of harmonic structure, but still have a structural importance rather similar to the *Ursatz*. Example 6.6 presents Salzer's analytical reduction of Carlo Gesualdo's (1560–1613) madrigal *Io pur respiro*. Example 6.6a shows Salzer's original symbols, 6.6b and 6.6c correspond with the analytical nomenclature used for this study. From a modal perspective the chords form a Phrygian progression that ends with a vertical consonance. The functional approach shows the weakened form of the Dominant that is used instead of V of the *Ursatz*.



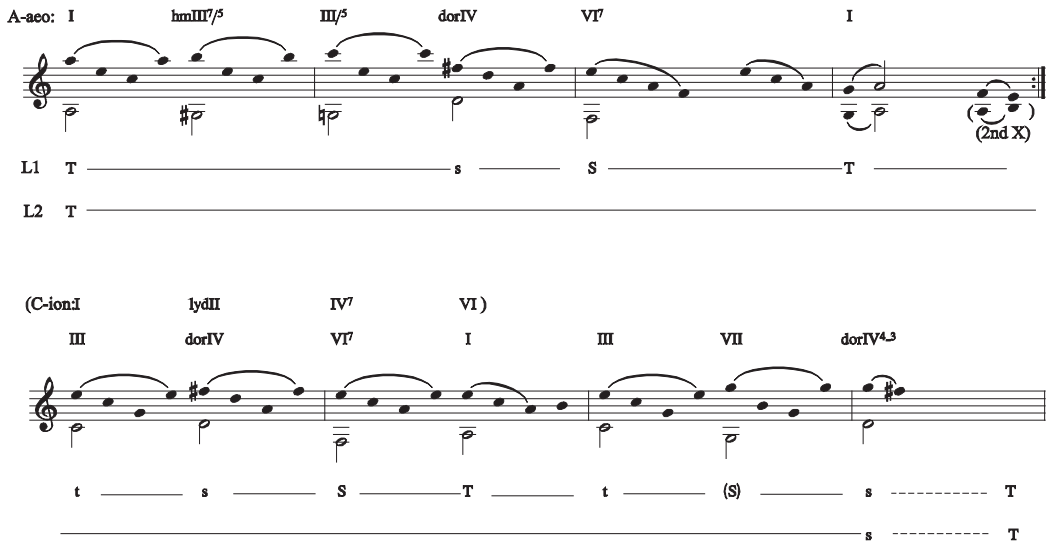
Example 6.6. Reduction of Io pur respiro *(Salzer 1982: fig. 479c), with a) Salzer's original nomenclature, b) modal analysis, c) functional analysis.*

For the purposes of this study, the levels mediating between the foreground and background, the various forms of middlegound, seem to be the most useful in most cases. Example 6.7, Judas Priest's "Sinner" (*Unleashed in the East* 1979; *Sin After Sin* 1977), clarifies the way in which structural levels may be understood in heavy metal. In this case some chords are interpreted as having a functional attitude that relates to a preceding chord and not primarily to the following one; the nomenclature is adopted here from Diether de la Motte (1987: 256). When taken one level deeper (L2), it can be noticed that mm. 1–3 form an Aeolian cadence and mm. 4–5 an authentic one. Thus, on different structural levels, some chords and progressions adopt a more linear function, whereas others serve as tonal focal points. Along with the succeeding examples, this first one shows one way of assimilating functional and linear analysis.



Example 6.7. Reduction and analysis of "Sinner" (chorus section).

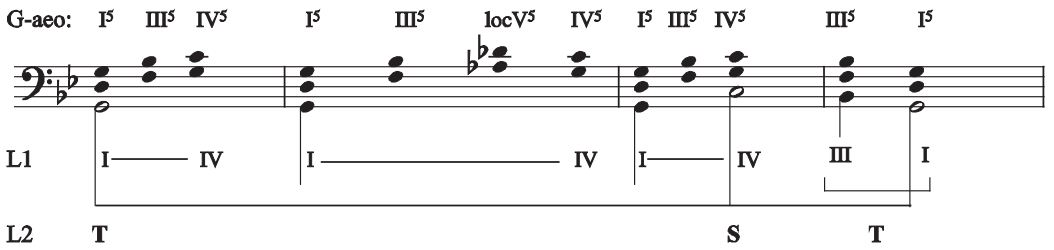
It would be unthinkable to present a study of classic heavy metal without remarking on the "classic of the classics", namely "Stairway to Heaven" (*Led Zeppelin [IV]* 1971). As shown in Example 6.8, the fundamental progression in structural Level 2 (L2) is from Tonic to Subdominant (the return to the Tonic is not shown in the graph) (cf. Fast 2006: 65). The progression is fundamentally Aeolian, although including several borrowings from other modes. In Level 1 (L1), the harmonic minor III and V are considered as linear/chromatic passing chords that lead to the Subdominant, which itself appears in two forms (Dorian IV and Aeolian VI) (mm.1–3). Measures 5–8 are interpreted as having more changes in respect of their function; both the Tonic and Subdominant are represented in their strong and weak forms; furthermore, a secondary subdominant leading to the Subdominant is used in m. 7.



Example 6.8. Reduction and analysis of the guitar part of the verse of "Stairway to Heaven" [0:54–1:33].

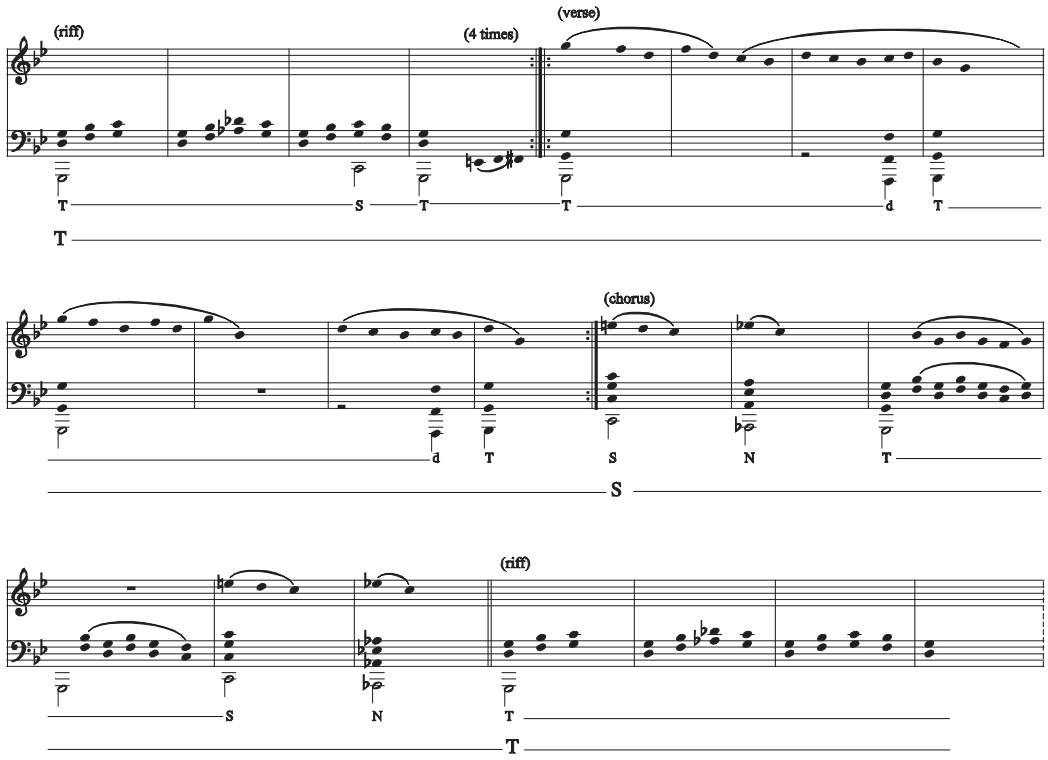
Although dismissed as unacceptable by Schenker, the use of plagal **TST** cadences is frequent in heavy metal (see Chapter 3.4; cf. Van der Merwe 1989: 246–247). "Smoke on the Water" shows plagal relations at different structural levels. Example 6.9 shows that the riff is underpinned by a **TST** progression (cf. Lilja 2007: 152–153). At the very surface, the chords are labelled according to G-Aeolian mode. The next level of analysis (L1) shows the reduction of linear/passing chords III and locV from mm. 1–3. On this level, however, the III in m. 4 may be thought of as more important, cadential even, if compared to the previous occurrences of the same chord. Level 2 introduces function symbols.

Now all but the very last IV, which is supported by the bass line, are interpreted as lower level linear motions that embellish the Tonic. Furthermore, the III in the same bar, although supported by the bass, may be seen as a passing motion between **S** and **T**. According to this interpretation, then, the riff is ultimately a four-measure Tonic-Subdominant-Tonic progression. This simple example shows a plagal system at work.



Example 6.9. Analysis of the riff to "Smoke on the Water".

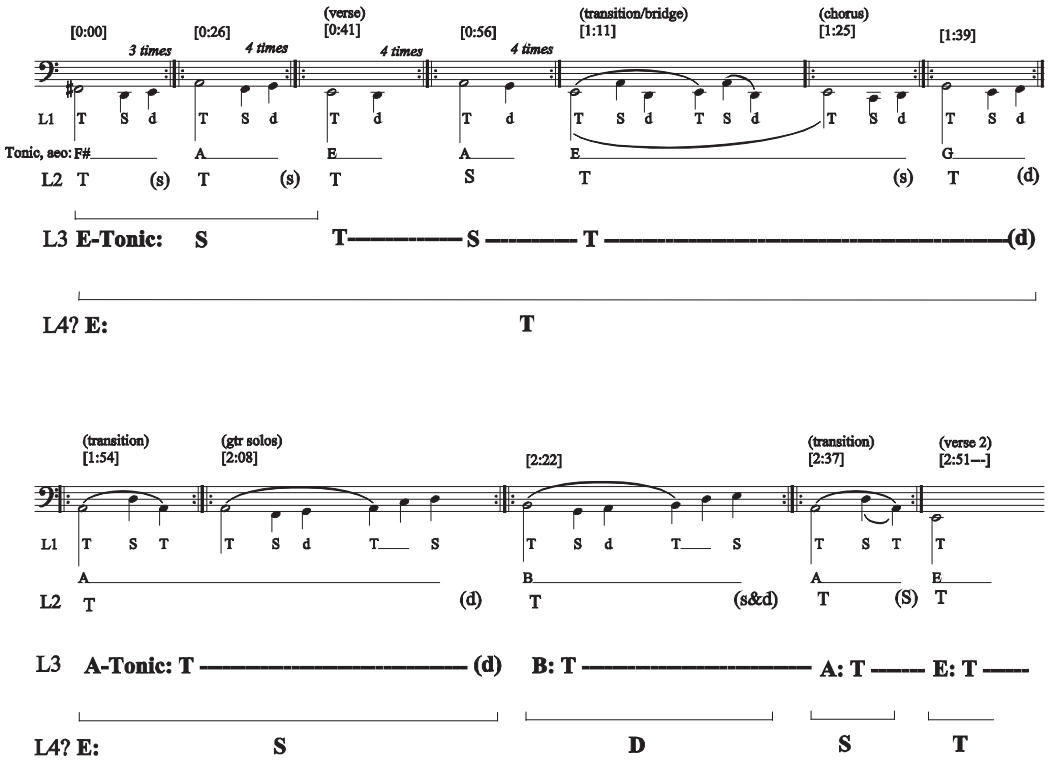
Example 6.10 shows that the same progression actually spans whole piece, an interesting example of a plagal system applied to a larger scale structure. On a deeper structural level, the riff-verse-chorus-riff structure follows the plagal **TST**; the riff and the verse are based on **T**, whereas the chorus section is based on **S**. The Phrygian II, or the Neapolitan chord, in mm. 14 and 18 of the chorus is here considered as a representative of the strong Subdominant agent (cf. Harrison 1994); the minor sixth in the vocal melody (top stave) supports this view.



Example 6.10. Reduction and analysis of "Smoke on the Water" [0:00–1:46].

The next analysis shows the functional relationships in Iron Maiden's "Aces High", which was analysed earlier (see Chapter 5.4, Example 5.54). For simplicity, only chord roots are notated in Example 6.11. Modulating constantly around different tonal centres, the piece makes extensive use of the Aeolian mode. All the local Tonics may therefore be regarded as Aeolian. The analysis is made on four hierarchic levels. Level 1 shows relationships within one central tone. As can be seen, Aeolian cadences with strong Subdominants and weak Dominants prevail on this level. Level 2 illustrates functional relationships of shifting tonal centres. For example, when a new tonal centre is presented in [0:26] the preceding F♯-tonality is interpreted in retrospect as having a weak Subdominant relation to the new Tonic A. Also this level shows a preference for plagal systems; it actually seems quite clear that plagal systems dominate harmonic progression at all levels. Level 3 shows that the, in the end, most of the tonal centres may be interpreted in relation to the Tonic E, the only exceptions being the shift to A and B Tonics in the guitar solo section. The F♯ and A Tonics that lead to E in [0:41] may be considered as an extended plagal cadence in the same manner as in "The Mule" (see Chapter 3.4, Example 3.30).

However, it is questionable, if a constantly modulating passage of this length can be perceived in such a way. For the same reasons Level 4 is even more hypothetical. Here, the A and B Tonics are understood as Subdominant and Dominant functions of the underlying E-Tonic. It remains unclear if this kind of relationships is actually perceived. However, if it is not, it may be concluded that Salzer's arguments about structural hearing in lengthy pieces also need some degree of revision.



Example 6.11. Analysis of "Aces High".

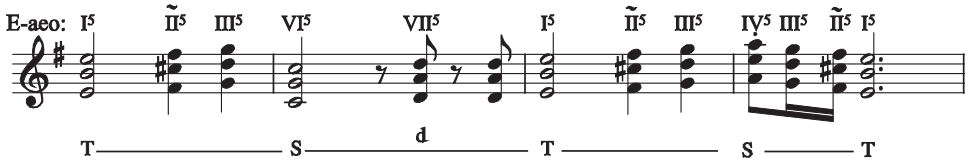
6.3. "Heaven and Hell"

Black Sabbath's "Heaven and Hell" serves as a final example, in which the theories and analytical devices presented above are drawn together. The composition presents yet another example of plagal systems; the **TST** progressions seem to form a basis for the whole piece from the surface levels to the fundamental structural framework. Furthermore, it is suggested that the opening riff serves as a fundamental structural element. Without claiming that the

sort of motivic or structural development found in the classical repertoire is taking place, Arnold Schoenberg's words seem appropriate before indulging in the actual analysis of the piece.

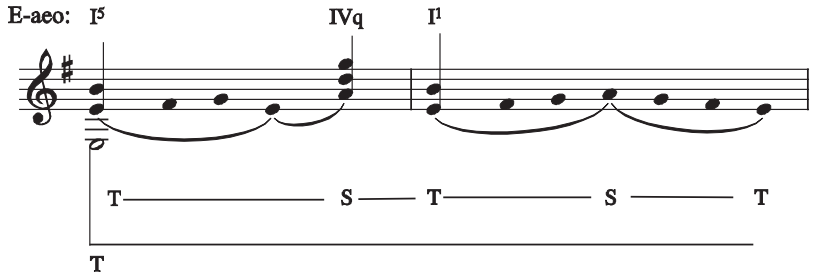
> The chief requirements for the creation of a comprehensible form are *logic* and *coherence*. The presentation, development and interconnexion of ideas must be based on relationship. Ideas must be differentiated according to their importance and function. (Schoenberg 1967: 1.)

It is suggested here that the opening riff and the plagal system provide logic and coherence to the composition as a whole – even though this is probably not the application, and certainly not the musical context Schoenberg was referring to.

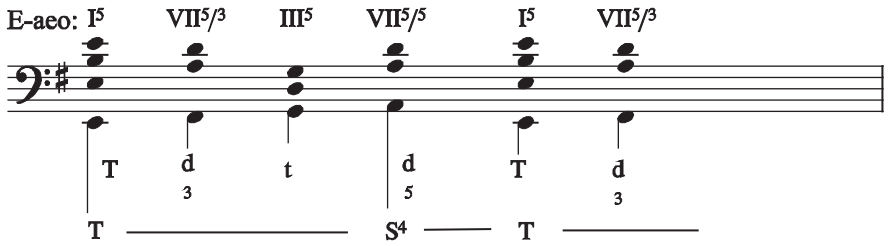


Example 6.12. Functional relationships in the main riff of "Heaven and Hell".

Most of the melodic/harmonic gestures within the piece are related to the main riff shown in Example 6.12. The first modification of the riff is heard against the Tonic drone on the bass (Example 6.13). Here, metric *diminution* (see Schoenberg 1967: 9, 11, Ex.14) has been applied to fit the original four-bar riff in two bars. The VI and the VII are omitted, but the fundamental melodic outline of the main riff prevails. In addition, functional relationships within the riff remain the same. Schoenberg's term for such variations is *modified repetition* (ibid.). The chord progression in the final section (Example 6.14) is similarly related to the main riff. The basic functional relationships are maintained here, but in this case the metric appearance is *augmented* (ibid.); every chord lasts for two bars. In addition to the change in their metrical appearance the two modifications differ in their relationship to the bass: in the first case (Example 6.13) the riff appears at the very surface level against the drone bass; in the second case (Example 6.14) the guitar is much more static, altering only between I, VII and III. In this modification, it is the bass part that has the main responsibility for carrying the motif. The fourth chord is of special interest: although it may be heard as a weak Dominant representative, at a deeper structural level it may be heard as a Subdominant, largely due to a prominent bass part.

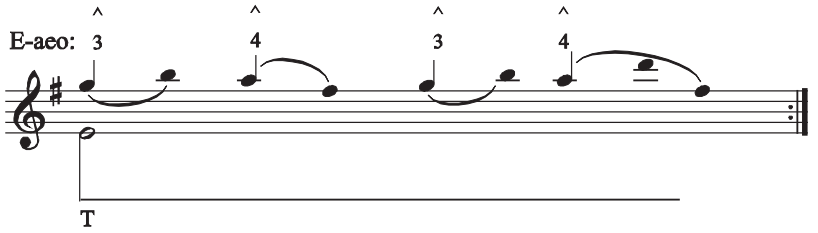


Example 6.13. Reduction of the guitar riff appearing after the first refrain in [1:00–1:11] and in the third verse in [2:38–3:10].



Example 6.14. Harmonic outline of the ending section, ca. [4:45-].

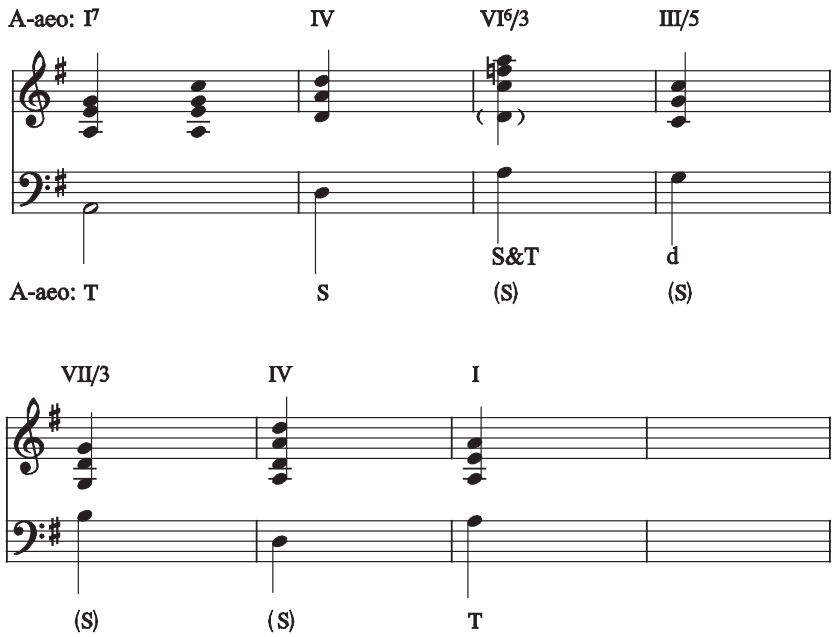
The **TST** relationships seem also to govern the guitar part of the second verse (Example 6.15). Here, the guitar's role is at the very surface, contributing more to the atmosphere than to tonal structure. However, its melodic focal points support the Tonic and the Subdominant (as the Tonic agent and the Subdominant base; cf. Chapter 3.4).



Example 6.15. Melodic outline for the guitar part in verse 2, ca. [1:18–1:40].

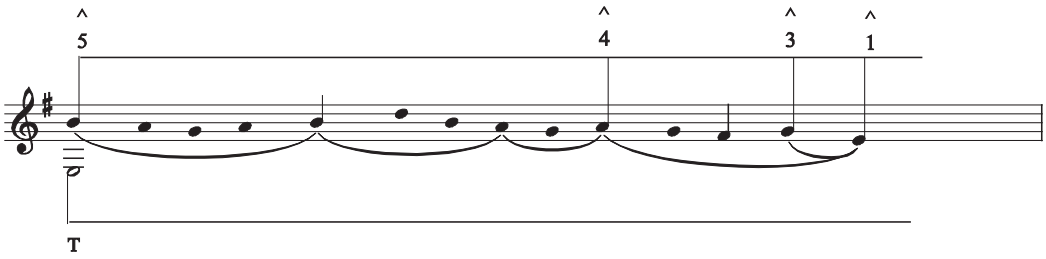
The bridge section (Example 6.16) modulates to A-Aeolian, representing the Subdominant function in the structural framework of the piece. The section itself can be interpreted as a Subdominant chain. Due to the contrapuntal interplay between guitar and bass parts, the chord in m. 3 can be heard as a first inversion of the VI[6], which may be regarded as a representative of both the

Tonic and the Subdominant. Likewise, the chord in m. 4 can be heard as III, or, if the bass part is stressed, as VII with the 6 and 4 (instead of 5 and 3) in the upper structure. Both of these allow an interpretation, according to which the chord has a functional attitude of a weakened Dominant **(d)**. In this progression, however, when the next chord is introduced these chords can be heard as secondary Subdominants. Apart from these two points, the section should be clear enough without further explanation.

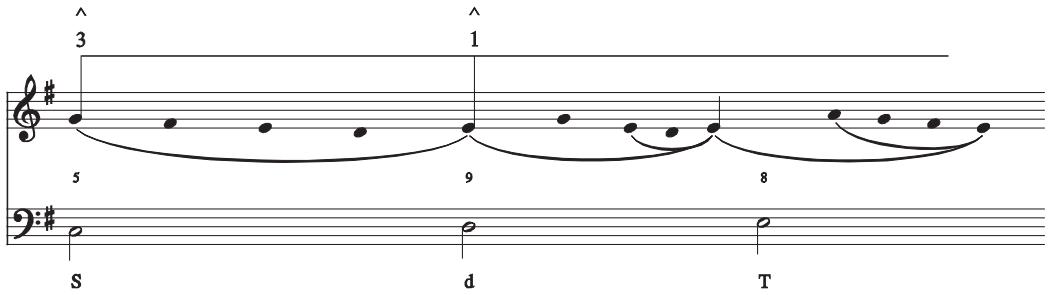


Example 6.16. Harmonic outline for the bridge section in ca. [2:18–2:39].

The melodic outline seems to be structured as follows. The melodies are constructed on E-Aeolian, although with an emphasis on the tones of E minor pentatonic. Although the melodic structure in Example 6.17 may at a stretch be seen as a descending fifth progression, the $\hat{2}$ is rather weak from the aural perspective, and consequently not shown in the melodic descent. Example 6.18 presents a similar case of $\hat{2}$ being relatively insignificant. In both these cases, as in the whole piece, it seems to function as a passing tone. Clearly, the tonal focal points of these melodic structures are $\hat{5}$ and $\hat{3}$. Similar melodic descents from $\hat{5}$ and $\hat{3}$ appear throughout the piece (Example 6.18). One may, with an act of will, perceive occasional melodic centres on $\hat{3}$ (refrain) and $\hat{4}$ (bridge). However, on higher structural levels the overall melodic line has no conclusive closure. Rather it stays on $\hat{5}$ to the end.



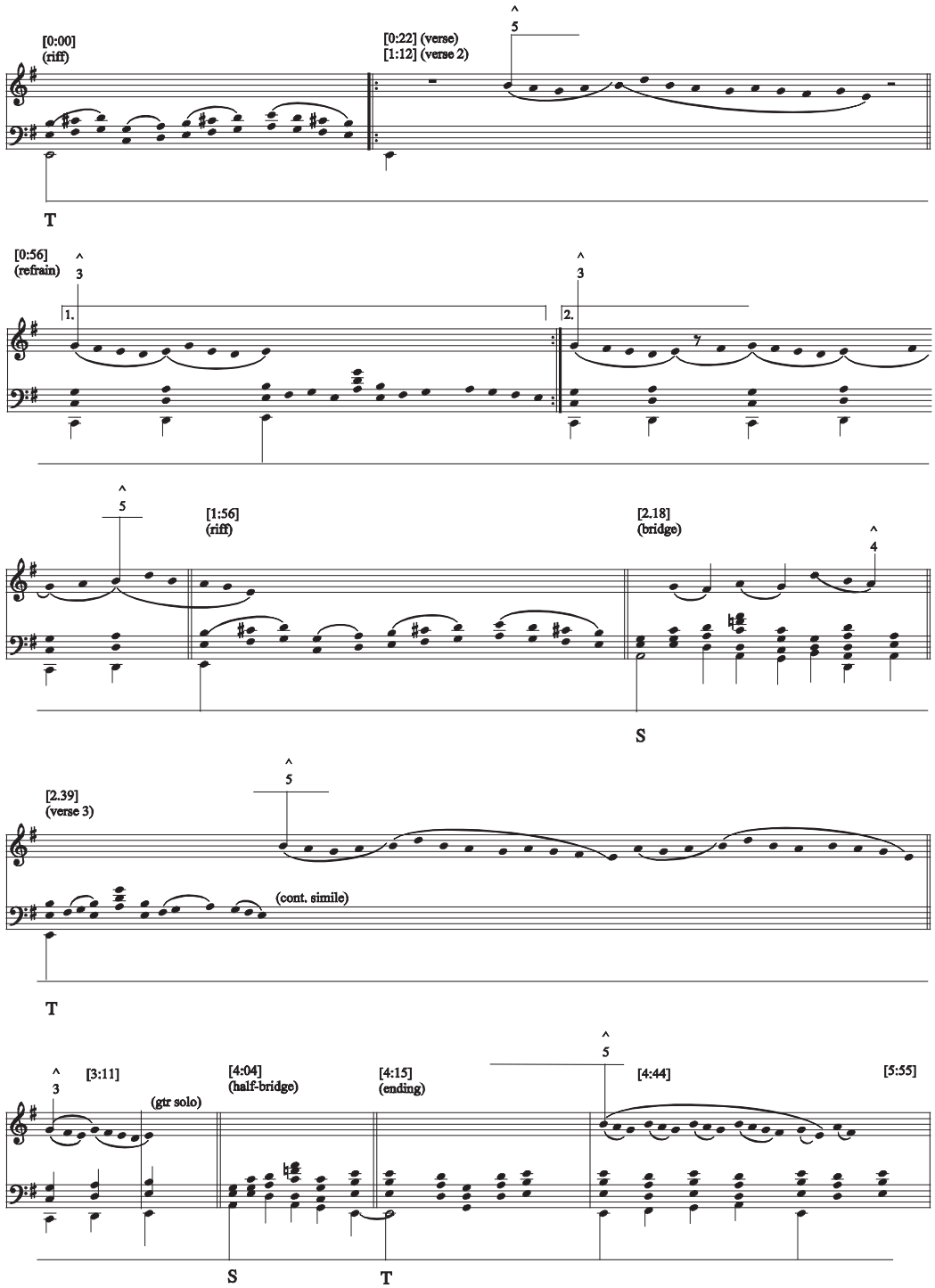
Example 6.17. Melodic and harmonic outline for the verse in ca. [0:22–056].



Example 6.18. Melodic and harmonic outline for the refrain in ca. [0:56–1:12].

Based on the previous discussion, the structural framework in "Heaven and Hell" is illustrated in Example 6.19. As a compositional whole, the piece forms a prolonged **TSTST** progression, in which the bridge sections represent the Subdominant function.

Structural framework and compositional development can have many forms and functions. For instance, "Heaven and Hell" and "Aces High" are structured differently, with the latter seeming to rely more on repetition than development. However, the structural framework of the composition appears to have an inner logic that may be described with conventional analytical tools. On the other hand, structural functions are easier to detect in "Heaven and Hell" because it is more tied to a single tonal centre. Also motivic development within the structural framework is taken further. Although these devices are not used to the same extent as by Classical or Romantic composers, a notable degree of compositional ambition has to be recognized. For example, not one section in "Heaven and Hell" is repeated without some kind of change.



Example 6.19. Reduction and analysis of "Heaven and Hell".

7

Conclusions

The heavy metal style is neither isolated nor self-sufficient with respect to its harmonic language. Rather, it is the product of cultural fusion, drawing its characteristic features from various sources. It has been my aim to demonstrate that while there are some features that may be considered essential to this particular style, some of its characteristics are shared with many other styles. The analytical and theoretical examples presented here seem to support this view, as well as demonstrating how heavy metal harmony of the classic era may be understood in general.

The final remarks here reflect the general hypotheses introduced in Chapter 1, and sum up the theoretical and analytic findings of the thesis.

The acoustic characteristics of the distorted guitar play a significant role, and have multiple affects on harmonic construction in heavy metal. Harmonic and intermodulation distortion produced by guitar distortion makes the instrument sound more harmonic, because the inharmonic string partials are overridden by exactly harmonic distortion partials. Furthermore, it strengthens harmonic overtones and produces combination tones that otherwise would not be heard. Contradicting earlier studies (e.g. Berger & Fales 2005), I have suggested that these combination tones are both acoustic *and* perceptual.

Guitar distortion seems to have a significant affect on compositional procedures. As Zarlino remarked in the sixteenth century, all compositions make use of both consonance and dissonance. This kind of division has served, and as I believe, still can serve as a descriptive device for any style within Western musical practice. Although the division of chords and intervals into consonances and dissonances has always been arbitrary, the division has been used from the Pythagoreans through to the modern times as a theoretical starting point for compositional practice; to separate the "acceptable" from the "unacceptable" structures. Consonances serve as a reference point against which dissonances can be measured, and in most cases, into which they should resolve.

The sonic characteristics of distorted guitar imply that the traditional categorization of consonance and dissonance needs to be rethought. The categorization I have ended up with here with is based upon not only the sonic characteristics but also the frequency of occurrence. The majority of heavy metal chords seem to be constructed according to the lowest harmonic partials of the harmonic series of a chord root; structures not arising from these, such as the minor triad and the minor sixth dyad, are far less frequently used. Thus, the work conducted here explains why the power chord dominates over other chord structures in the harmonic language of heavy metal.

Regarding music publication and, furthermore, pedagogy, the sonic structures produced by guitar distortion are often significantly different from the notated forms that are frequently seen. Heavy distortion makes these chords sometimes hard to recognize by ear. This has direct effects on notational practise: what should be written down, the notes that are actually played or the resulting aural experience? This is an issue that I have left for future research. Moreover, a classroom for harmony is usually only furnished with an acoustic piano, on which one may struggle to demonstrate power chords. I think that if these are to be demonstrated on the piano, the harmonics resulted by distortion should be taken into account. So, a "power chord" should be played with at least a major third and, perhaps, with a minor seventh to give at least a hint of the actual sound of the chord.

Heavy metal has strong ties and similarities with other Western musical styles, appearing as a combination of various musical traditions, a cultural fusion that makes use of allusions derived from various sources. This is largely due to the fact that many heavy metal musicians have been exposed to a variety of musical practices, in addition to the "boogie-blues" (Straw 1990: 91), and have subsequently made use of them. Apart from the blues, heavy metal chord construction is tied to musical practices that resemble those of the Renaissance and Baroque eras. For instance, it seems that chord construction is more frequently based on the Renaissance intervallic practise than on superposing thirds, which has prevailed in Western music theory since Rameau. Even though heavy metal is classified "popular" music, harmonic practices of, for example, Vivaldi or Palestrina, are more relevant than those of, for example, the American popular ballad or the Broadway musical.

The voice leading and counterpoint of heavy metal includes both the common practice style and the guitar-derived parallel style. Actually, the whole range of voice leading types (as defined by common practice theorists) is in use. From the aural perspective, at least, the guitar-based much resembles medieval *organum*. Heavy metal chord patterns may often be regarded as "indivis-

ible units" (cf. Moore 2001) that form "chord melodies" (Salmenhaara 1980) that are comparable to similar practices in the music of the impressionists and expressionists of 20th century art music. Furthermore, chord patterns often act as contrapuntal elements against the vocal melody, another parallel with the practice of organum.

Because contrapuntal textures seem to take precedence over homophonic ones, notions such as "chords are generally regarded as belonging to the accompaniment part of [the] melody/accompaniment dualism" (Tagg 2003a: 521–522) are shown in a new light. On the contrary, heavy metal chords are seldom there just for the accompaniment, instead forming an essential part of the compositional whole. It has to be granted, however, that in this sense there is a notable difference between American and European heavy metal, only the latter one actually discussed here in extent.

It is evident that much heavy metal is constructed on repetitive chord patterns. What has not been discussed earlier, however, is that these patterns often serve as similar structural frameworks as the "ground basses" of the Baroque. Moreover, the obvious major/minor tonal structuring in many compositions gives an example of enculturation of heavy metal musicians to Western tonal practices. Frequent references to Oriental music serve as further examples of cultural fusion. Regarding the prominence of other influences, it even seems that references to the blues, from which heavy metal is often said to have originated, are less predominant than has been previously thought.

To be honest, much of Western music theory is based on misconceptions about nature that later proved to be wrong. For instance Riemann and Rameau's theories of chords and harmony were largely based on a misunderstood acoustics, "pseudoscientific explanations" (Gossett 1971: xv), and on simple, sometimes even elementary mathematics. Throughout its history, music theory has tried to base itself on science or "natural laws". Although "science of sound" has had a great deal of influence in formation of music theory, it can be said that music theory has no real scientific basis nor is it "true" in the sense of natural sciences. Music theory is only "true" in the context of a closed system of a given theory, and is very often self-sufficient. Because of this it is actually impossible to say, for example, that the Schenkerian reading of the blues cadence is "false" and the Riemannian one "true". They are both only interpretations of, and attempts to understand, the same musical phenomenon. Still, what seems to be true in a general sense, is that the more rigid the analytical system (for instance, in terms of labelling), the less expressive it is in terms of various, and even contrasting, interpretations. However, both of these systems, among others, have been very important and influential in the way we have tried to make sense of music in the course of history; they are important for education and important for composition.

Theories of music work in two directions. In retrospect, they are used to describe what has been done, to find common denominators for musical actions, and to formulate a simple way to describe these actions. On the other hand, they offer ways to learn a musical tradition in a compact form without a need for everyone to go through the whole tradition from the scratch. Furthermore, theories offer a starting point for making music and thus contribute to the further development of a musical tradition. In other words, theory and analysis are important for the development of music; music as an art form or entertainment, which ever way we may want to see it. Music theory and analysis can and should be used for these purposes.

Heavy metal is clearly not so simple a musical style as has often been implied. Indeed, it has characteristics that point towards a more complicated structuring in both traditional and other directions that has been left unnoticed and unstudied. As suggested here, theories and methods of Western art music can be applied to heavy metal in a useful manner. The modal system serves as a basic framework for describing chord construction, although, as noted before, the sonic characteristics of distorted guitar need to be taken into consideration. For instance, whereas linear harmony tends to be more towards minor modes, acoustic structure offers an explanation as to why vertical harmony tends towards major modes. It is convenient, for example, to use Aeolian triads on VI and III: they are major when played in diatonic triads, and when they are power chords, they conform to both a diatonic and vertically consonant appearance.

Moreover, theories of harmonic function can give a perspective on tonal formations that goes beyond mere scale degrees. For instance, plagal **TST** patterns are often overlooked by other theories relying on conventional classical harmony. A functional approach may also be combined with Schenkerian to meet the same purpose. In larger scale harmony, this combination can be used to reveal such structuring over a longer time-span as in "Aces High" and "Heaven and Hell". In this kind of analysis, there is always a danger of relying on the eye over the ear. For instance, it may be questioned if the sort of "structural hearing" that Salzer (1982) has suggested is relevant in these cases. However, it seems evident that structural formation in both cases is not wholly arbitrary. Both these cases rely on a single phrase for the coherence of the whole piece. The structure of heavy metal is often considered as simple and, indeed it often is, especially from the 1980s onwards. However, examples such as "Heaven and Hell" and "Aces High" offer another perspective on compositional innovation within the style. Whether these innovations are intentional or intuitive, however, remains unclear.

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